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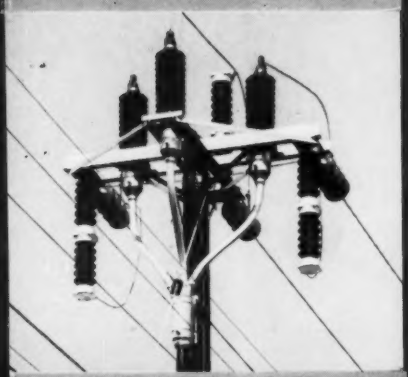

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ELECTRICAL WEST

February 1956
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Steam Plant Construction Was a Major Activity..... 93

Introducing the News Roundup—Turn to page 4 of this and each succeeding issue to find Electrical West's newest reader service. It is a fast-reading, industry-wide summary of significant events that may affect your business or the electrical industry as a whole. The staff hopes you will make this new, informative editorial feature a reading habit.

Annual Review and Forecast

We're beating the drum!

Like parades? Here is one you're sure to enjoy! It's the big sales parade which is going to make this the best year yet for the electric industry in Central and Southern California.

Edison's Business Development Program for 1956 is under way. It's a complete year-long program of aggressive selling, covering every phase of our market and carried out under the active leadership of Edison personnel and Edison advertising. Its objectives: increased business for electrical appliance dealers, equipment sellers and electrical contractors, among others. We're beating the drum—and loudly!—not for ourselves alone but on behalf of the entire electric industry.

Edison

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MORE LIGHT PER DOLLAR

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REVOLUTIONARY NEW SMOOT-HOLMAN

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LUMINOUS INDIRECT LUMINAIRE

Using New 800 Milliampere Lamps

Totally new in conception, design, performance. Takes full advantage of the high output of new 800 MA., rapid start lamp. The only indirect luminaire available that *mounts within 12 inches of ceiling without severe light blocking.* Slender lines and open construction pass amazing percentage of upward light back to work surface . . . Gives you *far more light per dollar* than ever thought possible. Louvering effect of fixture subdues ceiling brightness. No pronounced ceiling pattern. Faultless light distribution; its comfort and quality astonishes everyone.

By all means, investigate this exciting new fixture promptly. The more you know about it, the more use you'll find for it. Its possibilities are limitless. Where shall we send your complimentary file of technical data? Kindly mention this publication and our catalog number, PV-288.

Features

- **Upward and downward light balanced for best seeing.**
- **High efficiency.**
- **Brightness meets ASA school lighting standards.**
- **Mounts within 12" of ceiling without blocking return light.**
- **Near perfect visual comfort in any size room.**
- **High adaptation level yet low brightness and brightness ratios.**
- **Economical to install.**
- **Easy to maintain.**
- **Harmonizes well with modern architecture.**
- **Extremely flexible in arrangement.**

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ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

THE ALL-INDUSTRY MAGAZINE OF PROGRESS, ESTABLISHED 1887,
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VOL. 116, NO. 2 FEBRUARY 1956

37th Annual Review and Forecast

Accelerated Growth Continues 83

New programs will add over 11,500,000 kw to Western generating capabilities in next five years.

Tempo Increases for Western Utility Construction 86

Budget nears the billion-dollar mark; combined peak last year—up 13.2% over 1954.

Teamwork Keynotes Promotion Plans 118

The year 1955 was a good one saleswise; 1956 is expected to be as good or better.

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Cover photos: Valley steam plant, Los Angeles Department of Water and Power; Snohomish 345 kv line, Bonneville Power Administration; Helicopter line patrol, Puget Sound Power and Light Co.; Cable riser pole, Hawaiian Electric Co.; Water heating campaign, Portland General Electric Co.

Next Month

Articles for March include: how utility management can use electronic data processing; greased aluminum conductors; new substation design; bundled conductors; automatic load control; a new steam plant; high school with 277/480-v distribution, luminous ceilings, unit substation and other features; another in the series on grounding.

An important feature will be the annual summary of sales accomplishments of Western utilities.

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Cleveland (15) ..... Frank Seiler, R. A. Hubley, 1510 Hanna Bldg., Superior 1-7000
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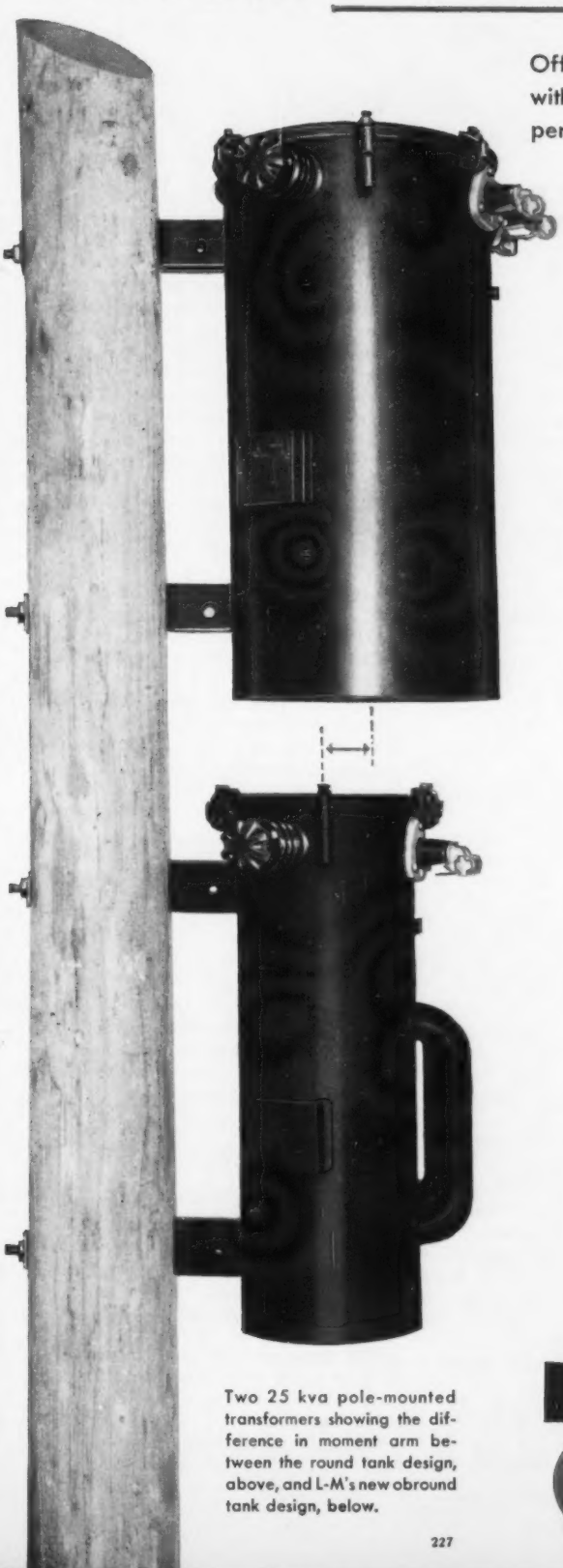
How L-M's New Obround Design Provides 27% Less Bending Moment



Two 25 kva pole-mounted transformers showing the difference in moment arm between the round tank design, above, and L-M's new obround tank design, below.

Offers 33⅓% increase in transformer capacity on a pole, with no sacrifice of L-M's outstanding Round-Wound® performance characteristics.

L-M's new obround tank design is smaller, lighter, and has a shorter moment arm on the pole. The total bending moment is substantially reduced. Thus the potential capacity of all your transformer structures is greatly increased. L-M's new obround tank design retains all the outstanding Round-Wound performance characteristics.

Less Weight, Shorter Moment Arm

The new obround design has a smaller tank with less transformer oil, resulting in a lighter, easier-to-handle transformer. Cooling tubes are installed where required to provide adequate cooling surface. Transfer of heat from copper to outside air is faster and more efficient because of reduced mass.

The new obround design also reduces the moment arm distance from the pole. The combination of less weight and shorter moment arm distance greatly reduces the total bending moment on the pole.

COMPARE 50 kva *round* tank design and L-M's new 50 kva *obround* tank design:

50 kva ROUND tank design:
Moment arm from center of pole.....1.6 ft.
Weight.....860 lbs.
Bending moment 860 x 1.6.....**1,376 ft.-lbs.**

50 kva L-M OBROUND tank design:
Moment arm from center of pole.....1.33 ft.
Weight.....760 lbs.
Bending moment 760 x 1.33.....**1,010 ft.-lbs.**

L-M's new 50 kva *obround* transformer puts 27% less bending moment on the pole than the 50 kva *round* tank design. That means that you put less strain on your structures—or you can now hang three 50 kva's where you formerly hung three 37½'s—a 33⅓% increase in capacity.

Round-Wound Performance

The advantages of less weight and shorter moment arm were accomplished without changing L-M's outstanding Round-Wound performance characteristics. These characteristics include low exciting current, high impulse strength, high short-circuit strength, and high short-time overload capacity.

Get Details on L-M's Obround Transformer

Ask the L-M Field Engineer for application information, weights and dimensions on L-M obround transformers and the exclusive Round-Wound design. Or write A. B. Coyle, Product Manager, Line Material Company, Transformer Division, Zanesville, Ohio (a McGraw Electric Company Division).

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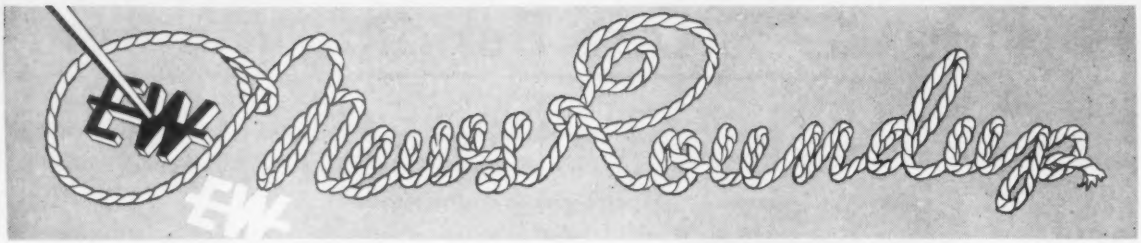
LM® Transformers



SIGNIFICANT ITEMS FROM THE EDITORS' NOTEBOOKS

SURPRISE—5.2c per kwh will be the cost of energy from the country's first atomic energy station at Shippingport, Pa. In a December meeting with industry executives, AEC's Admiral Rickover unveiled the over-all power costs on the $85,000,000 (nuclear portion only) 60,000-kw plant. Fuel charges will be 39 mills based on a total fuel cost for the station of $18,000,000. Other components included 15 mills per kwh for fixed charges, 3 mills per kwh for operating and maintenance costs with an offsetting credit of 5 mills per kwh based on value of unburned fuel.

Reason for the fabulous 52-mill figure (seven to eight times competitive sources) lies in the flexibility being built into the station. This will permit interchangeable reactor cores and other equipment that is "justified by the additional knowledge that will be gained." Improved core performance is likely to cut the over-all cost per kwh to 39 mills and the Admiral expressed the hope that about 10 years from now an advanced 90,000-kw core might produce electricity for about 14 mills per kwh. It is also assumed that improved manufacturing techniques in fuel development and a core life double the present 3,000 hours will contribute to this reduction.

Duquesne Light Co. of Pittsburgh, among other things, is supplying the site, building, operating and maintaining the turbogenerator plant, and will contribute $5,000,000 to the design, development and construction of the reactor. The company will pay AEC at the rate of 8 mills per kwh for energy over a five-year period.

-EW-

ATOM (CON)FUSION—Senator Morse (Dem.—Ore.) has proposed a large-scale atomic reactor station for the Pacific Northwest. It would be government-financed, owned, and operated, and located at the great Hanford, Wash., works of AEC. It envisages the use of the tremendous quantities of waste heat now dissipated in the Columbia River to produce electricity for "slightly under 4 mills per kilowatt-hours" at 80% load factor.

The Portland (Ore.) Journal editorialized that the idea sounded sensational ". . . but the trouble was that it ignores the engineering and economic facts which everyone in the atomic energy and power fields long ago discovered—everyone apparently but Morse." Basis for the latter statement lies in the fact that it would involve a drastic and expensive remodeling of the Hanford reactor on a scale that would bring the proposal into the classification of economic folly.

Other commentators, however, anticipating that the senator will back up his proposal with enabling legislation, foresee an influential support for all-federal power reactor stations in the Pacific Northwest—with all that that implies.

-EW-

"LIVE BETTER . . . ELECTRICALLY"—That's the new slogan of a broad industry movement (aimed at increasing the use of residential electricity) kicked off early this month in more than 80 cities across the U. S. A closed circuit television program brought to thousands of businessmen a dramatic presentation of the marketing opportunities which lie ahead in fulfilling potential sales for electrical goods and services in the home. You will see and hear more about the slogan and this symbol as this broad, long-range program gets under way.

ABOUT THE ROUNDUP

This new ELECTRICAL WEST *reader service aims to give you in capsule form important Western and National news. It will be a fast-moving commentary on significant events and developments —and maybe sometimes even seasoned with a little levity, irony or satire.*

We hope you'll like the News Roundup.

THE EDITORS

At press time Westinghouse is sticking to the guns to get agreements on its five-year plan with unions. In the fold with signed contracts now are IBEW and the Federation of Westinghouse Independent Salaried Unions. Still striking are International Union of Electrical Workers and the independent United Electrical Workers. Of 48,000 employees working now 23,000 are represented by unions. This is only 28% of Westinghouse union member employees.

-EW-

NOT SINCE GOLD RUSH DAYS of '49 has the upper Sacramento Valley had such a boom.

Even the floods, costly in lives and damage, will step up the Trinity and Feather River projects and bring people and pay rolls to accelerate the house building, commercial building and even industrial development of this long dormant area.

There is even talk of a steel producing plant, reopening of copper mines. The pressure of growth seems to be northward as thousands per day still come West.

-EW-

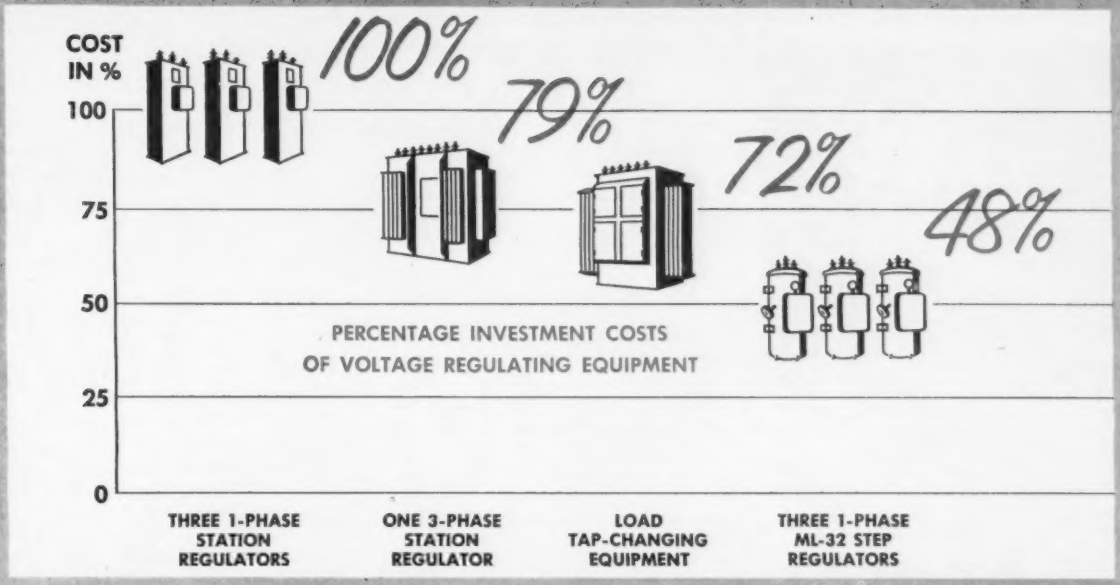
Congratulations to National Electric Products Corp. and to Ebasco Services Inc. They are 50 years old, and both sent us very nice historical booklets.

-EW-

WILL THERE BE ENOUGH trained electricians to install the wiring and equipment that the West's growth—doubling in less than 10 years—will require?

Many contractors are afraid not, feeling the present shortage of really skilled men and looking at the trickle of new apprentices being turned out even from the best-run joint apprenticeship programs.

Certainly the money incentive should appeal to high school youngsters. Good journeymen earn more than college



Cost comparison shows ML-32 voltage regulators

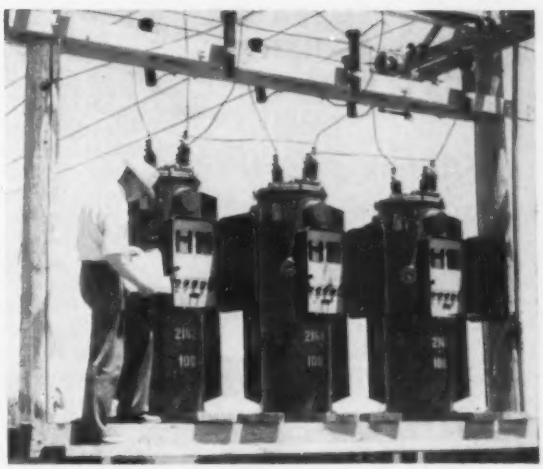
REDUCE REGULATOR INVESTMENT 50%

With new higher KVA ratings and increased current-carrying capacity now available, General Electric pole-type, single-phase Type ML-32 step voltage regulators make possible low-cost regulation in a wide range of applications, including substations as large as 8000 kva.

Compared with more expensive equipment, they can cut the cost of efficient regulation by more than 50 percent, as shown in the chart above. (This representative illustration compares the approximate relative costs of regulating a typical 3000 kva, 4 kv substation.)

Increased opportunities are thus offered to utilities not only to extend the use of voltage regulation, but also to benefit from increased revenues and savings through deferred investment in line rebuilding.

General Electric ML-32 regulators offer ±10% regulation in thirty-two 5/8% steps, in all standard voltage classes for circuits up to and including 14.4/24.9 kv. In addition, when installed on lines requiring only ±5% regulation, the G-E ML-32 step regulator will comfortably carry 160% of rated current (to a maximum of 400 amperes). For information on ratings and applications, get in touch with your local General Electric Apparatus Sales representative, or write for publication GER-1154 to Section 423-11, General Electric Company, Schenectady 5, N. Y.



ONLY THE ML-32 REGULATOR gives you ALL the most advanced features—including Class 1 control accuracy, control dial locking, "Bounce-free" Opti-life switching for increased contact life, up to 120 seconds time delay, internal by-pass protection and many other advantages. They add up to the most efficient, economical regulator of its type available today!

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graduate engineers in many cases.

Some unions show reluctance to admit more boys, because they enjoy the power that monopoly and shortage of skilled men gives them.

It is an industry problem that needs far more attention from everybody.

-EW-

Engineering students of the University of Arizona will get experience, training and pay by working six months a year for various employers, including Arizona Public Service Co., Motorola Inc. and Salt River Power District.

-EW-

KUDOS—Five Western utilities, the Idaho Power Co., the Montana Power Co., Pacific Gas and Electric Co., Pacific Power & Light Co. and the Southern California Edison Co. were among the 32 public utilities cited by the American Institute of Management to receive the award for excellent management.

The AIM awards were established "to bring deserved recognition to those companies whose managements are doing the most to increase productivity with accompanying benefits to employee-shareholders, their community neighbors and to the economy as a whole."

-EW-

JUST WHEN COPPER PRICES had seemed to reach a plateau the Chilean strikes cut production and the price edged up again. This affected all electrical products, from apparatus to wire, in a rising tide of prices.

But copper's new price spurred the West's mines to new production peaks.

Arizona, with 45% of the total domestic production of copper, felt that copper had balanced the losses from its other two C's—cattle and cotton. Montana, Utah and Nevada experienced similar bolstering of their agricultural economies from copper's rise.

-EW-

TUBE CLEARINGHOUSE—The National Bureau of Standards has established a tube information service for accumulating and disseminating technical data on both domestic and foreign radio tubes.

At the present time nearly 10,000 cards, filed by tube type number, are appropriately referenced to manufacturers' source material. This source of reference data also include junction diodes and transistors.

From it engineers in industry who have legitimate requests may find information about any particular tube, or all tube types whose electrical characteristics, bulb sizes or base configurations fall within a particular range, or domestic tubes that could be substituted for unavailable foreign designs.

Inquiries should be addressed to C. P. Marsden, Chief, Electron Tube Section, National Bureau of Standards, Washington 25, D. C.

-EW-

Can't help but appreciate the way Allis-Chalmers is treating a recent blow-up of one of its steam turbines. Instead of going underground until it blows over, they have paid for a scientific analysis of what caused it, and then published the results in a booklet available free by writing the company. Ask for "Investigation of Large Steam-Turbine Spindle Failure." Address is Box 512, Milwaukee 1, Wis.

-EW-

SHOPPING CENTERS will take more business to the suburbs.

Three noteworthy examples: In Phoenix under construction is the $5,000,000 Park Central project due to be done by this fall.

In the San Francisco Bay region the Emporium, just completing a big shopping center at Palo Alto, has announced two more, one in San Jose, the other Mill Valley north of the city across the Golden Gate.

Portland's Meier & Frank just completed one in Salem.

-EW-

Look for Congress to put some heat on the relatively "tax-free" status of cooperatives this year. Treasury Dept. is preparing a bill that will make co-ops distribute 20% of earnings as patronage dividends to owner-customers. Patrons then get nicked by Internal Revenue for the income. Some say this will put $500,000,000 a year in the Treasury till, which would be a healthy contribution toward budget balancing or reducing income taxes for everyone. It should gain election year popularity.

-EW-

HIGHER UTILIZATION VOLTAGE thinking and studies should be stepped up to determine now whether a new fundamental plan of distribution is desirable for expanding loads.

Griscom and Lawrence, Westinghouse, made the suggestion at the mid-

SLOW SPEED... that's one difference between the Sangamo J2 and other watthour meters. The disk of the J2 makes fewer revolutions to measure the same load.

What the J2's fewer revolutions mean in terms of one year's time...

The disk of the J2 revolves 166⅔ times to measure one kilowatt hour. Other meters make 277.7 revolutions to measure a kilowatt hour.

This year's average residential load will be approximately 3000 kilowatt hours. If you multiply this figure by 277.7, you get 833,100 —the number of revolutions a 3.6 constant meter makes in measuring 3000 kilowatt hours.

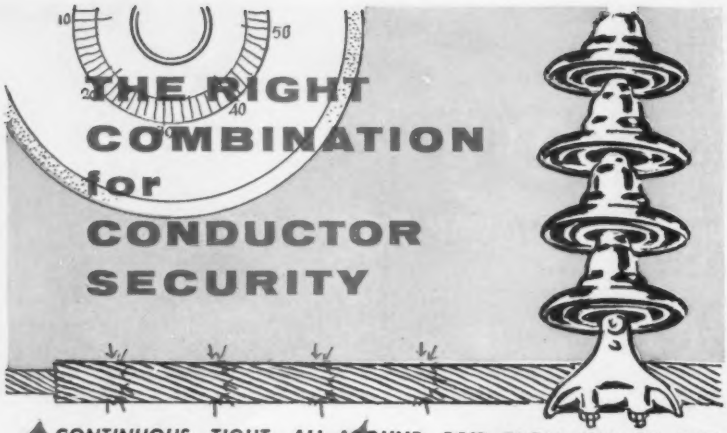
When we multiply 3000 kilowatt hours by 166⅔, the speed of the J2, we get 500,000. The difference between 500,000 and 833,100 is 333,100. In other words, the J2 makes 333,100 *fewer* revolutions in a year's time to measure the same load! 333,100 *fewer* revolutions to cause wear on moving parts. Think what it would add up to in 30 years!

That's why we say "the slow speed of the Sangamo J2 adds years to its life."

JM56-1

SANGAMO ELECTRIC CO.

SPRINGFIELD, ILLINOIS



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DEPENDABLE PERFORMANCE

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RE-USABILITY

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LOW INSTALLED COST

Fine Fanner Superformed Rods provide both initial and long term economy through low cost, easy application and multiple capabilities.

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winter AIEE in New York. It is their opinion that substantially improved economy can be obtained by increasing distribution system voltage and that approximately double voltage will suffice.

It is their further opinion that a three-phase, four-wire system with voltage in the general level of 265/460 would be most economical. It is presumed that autotransformers would be used to serve lighting and run-of-mine small appliances.

-EW-

FARM SHIFT—Latest report from REA lists only 314,350 unelectrified farms as of June 30, 1955. Based on the latest farm census the U. S. farm electrification job is 93.4% complete with 4,468,043 farms now receiving central station service.

As interesting and commendable as these figures are, the report contains a still more significant figure. Since the beginning of 1935 when the REA was first established, the total number of farms in the U. S. has dropped by more than 2,000,000. Science must be a wonderful thing if the nation can lose one-third of its farms, grow in population by 20,000,000 and still have two of its most pressing economic disputes on the subjects of what to do with farm surpluses and how to bring more land under irrigation.

-EW-

Vancouver, B. C., is getting a new $3,500,000 copper mill. Western Copper Mills Ltd. plans an early start on the plant, which is destined to produce copper tubing, pipe and bus bars. Capacity will be about 675 tons monthly and output will go to Canada and Western U. S.

-EW-

STYLING HIGHLIGHTS—The imagination of the designers of home furnishing items is still working in high gear. Visits through the winter markets reflect a degree of high styling that sometimes border on the garish but leaves no doubt that functional design coupled with colored metals and plastics has opened a broad new field to tempt the housewife into replacing or remodeling into gay, new motifs.

Some of the eye-stoppers at the marts included built-in electronic ovens, swing-out crispers on refrigerators, table lamps with telescopic bases and floor lamps with "touch"-type switches. New ranges feature larger ovens, many with rotisserie attachments, and one boasts of a swing-out

GOOD SERVANT?

...OR BAD MASTER?

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Get Dependability at its Best . . .
All Along the Line

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Subway Transformers • Industrial Dry Type Transformers • Capacitors

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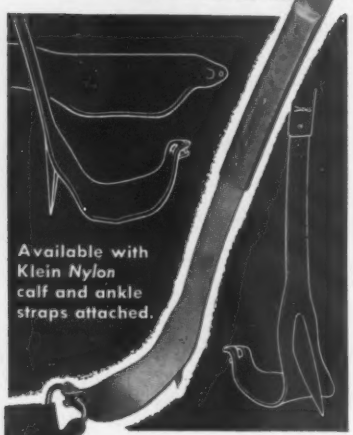

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KG NO. 1 GAFF GAUGE Keep this precision gauge handy for a safety check on proper spur shape. Plated steel—packed in durable plastic case.

1901-MG GAFF GUARDS Protect the all-important spur of your climbers with this new Klein gaff guard. First quality leather with spring clip.

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broiler. Most unusual was a power-operated sofa that converts into bed and vice versa at the push of a button.

Color in two-tone combinations combined with copper, silver and brass fittings follows the current trend in automobile styling. Even the TV manufacturers are moving rapidly into colored cabinets.

All in all, the modern, colorful design trend throughout the whole home furnishings line is liable to make the average homemaker as dissatisfied with her current decor as she would be with a seven-year-old automobile. Maybe this trend is just another facet of the philosophy of a replacement economy. And maybe it offers a new chance to corral more of the consumer's disposable income dollars, so many of which lately have been channeled into the automotive field.

-EW-

Aspirin will probably become a substantial part of the diets of the Idaho Power Co. and Morrison-Knudsen Co. folks who handle taxes and pay roll on the Snake River jobs. Part of each dam is in Idaho, the other part in Oregon. Proper appropriations of income taxes, workmen's compensation funds, property taxes and unemployment insurance must be made. First step to straighten things out is to find the middle of the river channel. It is the legal boundary between states.

-EW-

ATOMIC PACE—Trying to keep up with the blossoming technology of the atom is going to be difficult.

At present there are five approaches to atomic power—pressurized water, boiling water, sodium graphite, homogeneous, and breeder-type reactors—under study.

A sixth approach, the liquid metal fueled reactor (LMFR), awaits only the appropriation of congressional funds to initiate construction on an experimental model with a thermal power level of between 5,000 and 10,000 kw.

The LMFR study group estimated that a full-scale plant could produce electrical energy at a cost of 7.1 mills per kwh.

And that's not all. A seventh type, the organic moderated approach, is under consideration. The LMFR type would use a liquid metal alloy composed of uranium and bismuth as the fuel instead of a solid material used in the "conventional" types. All this activity is indicative of the speed with which technology is pushing back the horizons of practical atomic uses.

INCANDESCENT ELECTRIC HEATERS will reduce the microbal content of air in homes by as much as 50% during the heating season. This statement was made by J. C. Beckett, Wesix Electric Heater Co., San Francisco, and C. E. Clifton, Stanford University, at the winter general meeting, AIEE.

Their studies support the contention that high temperature heaters such as the more conventional incandescent electric heater exert a considerable bactericidal and sporicidal effect.

It takes several hours operation to achieve a stable minimum condition but the germicidal action appears to be much more rapid than that observed with ultraviolet lights as ordinarily placed in a room.

-EW-

TRADE STRAWS—TVA rationed power to six big industrial customers including Aluminum Co. of America because of low water conditions . . . Westinghouse Electric Corp. will not meet recent cuts in list prices of housewares made by G-E . . . Steel demand may ease somewhat due to first quarter cutback in orders by auto industry . . . Scrap copper prices declined to 41c lb for No. 2 copper wire . . . "Look for a slowdown in housing starts this year" is concensus of recent meeting of home builders in Washington. In mid-January FHA relaxed credit a little, upping repayment period on government-guaranteed mortgages to 30 years.

Winter marts reflected optimistic views on consumer buying. Orders placed at Chicago shows were well ahead of 1955 . . . Both the House and Senate have approved bills authorizing about $3,000,000 for a survey of the feasibility of the controversial Passamaquoddy (Maine) Tidal Power Project . . . Sandy Electric Co-op (Ore.) voted 449 to 204 to open negotiations to sell the system to a utility—logical buyers: Portland General Electric Co. or Pacific Power & Light Co., see page 153 . . . City councilmen of Othello, Wash., let a franchise to Big Bend Electric Cooperative die on the vine last month, so Washington Water Power continues as the city's sole supplier of electricity.

-EW-

MAKE RESERVATIONS NOW FOR—Feb. 29 winter conference of San Diego Bureau of Home Appliances; March 16 annual conference of Intermountain Electrical Assn., Salt Lake City; March 22-23 Engineering and Operating Section, PCEA, San Francisco. Be thinking about April, too. Calendar on p 148.

COMBINATION ENTRANCE CAPS Here's a real "2-in-1" entrance cap ... approved by Underwriters' Laboratories for both rigid conduit and EMT... permits stocking of one cap for two purposes... eliminates threading of rigid conduit. Comes in sizes from ½" to 2".

THREADED CONDUIT ENTRANCE CAPS Like most other Gedney entrance caps, this one is made of malleable iron to prevent breakage... hot dip galvanized for maximum service life. Sizes range from ½" to 6".

ENTRANCE CAPS For S.E. Cables—with key hole mounting bracket. Easy to assemble—cable slips into cap and is securely held by clamping shoe. Has split insulator and well bushed holes. Overlapping cover protects cables from weather. As there is little strain on this fitting it is made of aluminum.

Cross the threshold to lower costs...with GEDNEY ENTRANCE CAPS

Malleable Iron—Hot Dip Galvanized

THESE ENTRANCE CAPS install faster—and cut your *final* costs right down to rock bottom. Like all Gedney Fittings they're accurately machined and threaded...smooth finished, with no burrs or metal particles. On top of that, the Gedney line includes many improved design features that bring extra efficiency and labor savings. For fittings that bring today's lowest installed cost, specify Gedney!

GEDNEY FITTINGS FIT

GEDNEY
ELECTRIC COMPANY

GEDNEY

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Foundry, Factory and Shipping Point: Terryville, Conn.

SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

DAVEY LINE CLEARING
DIVISION OF
DAVEY TREE SURGERY CO., LTD. OF CALIFORNIA
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FARM WIRING AID—The first National Farm Wiring Conference will be held in Chicago's LaSalle Hotel, May 3-4, under sponsorship of the Farm Electrification Bureau. Purpose is to help farmers fill gap left by nonexistent farm labor through electrification. It will bring together technical specialists from industry, national farm organizations, the USDA and educational institutions in a shirt-sleeve meeting to lick wiring inadequacy on the farm.

-EW-

"Housepower" is the new name for adequate wiring. EEI has announced an ad campaign to modernize 20,000,000 homes. May it be as successful as the horsepower race of the auto industry.

-EW-

MASS CAPITALISM—Politicians who are worried over the "labor vote" might take note of a recent tabulation from the U. S. Chamber of Commerce. Stockholders in American businesses loom larger and larger as a political influence. Many large corporations have from two to 10 times as many shareholders as employees. One-third of families owning stock have less than $5,000 per year income. Countless others have a stake in insurance and pension funds.

This new generation of "capitalists" has yet to be clearly recognized by the PR savants for the potent force it could be in the legislative halls.

-EW-

Three holdover Democrat lawyers will represent the U. S. in the coming suit of the Dixon-Yates power group to recover $3,000,000 damages from the famous contract cancellation. They are John B. Miller, S. R. Gamer and Kendall M. Barnes.

-EW-

RULING ON COMMUNITY TV—Jurisdiction is claimed over companies furnishing TV antenna service (community TV) in a ruling by the California Public Service Commission.

The precedent-setting ruling held that firms supplying such service are "telephone corporations" under the Public Utilities Code and subject to the same consideration as telephone service.

Subject of the order was Television Transmission Inc., furnishing coaxial cable TV antenna service to 950 subscribers in Walnut Creek, Lafayette and Martinez, Calif. Contact is made on telephone and power poles.

ALLIS-CHALMERS
NETWORK
TRANSFORMERS

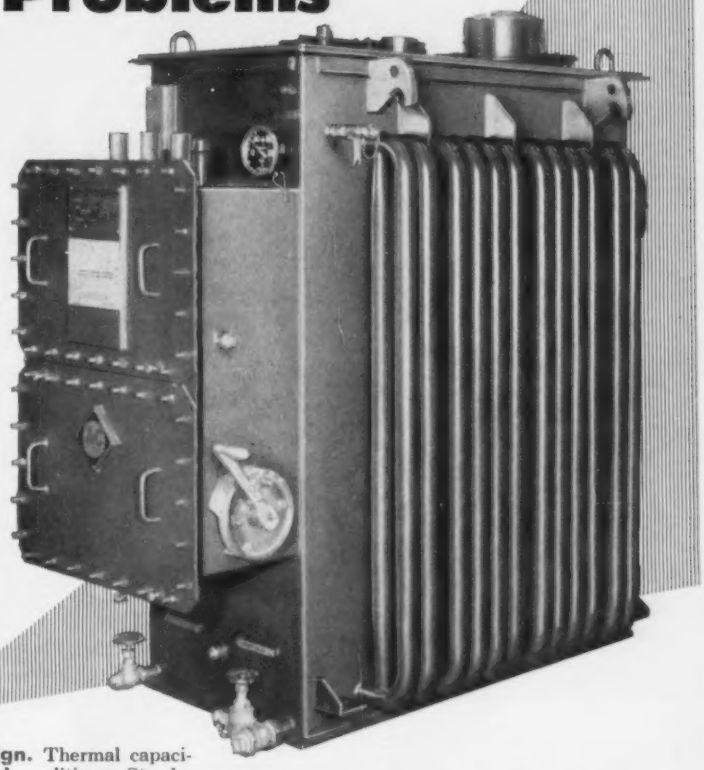
Space-Saving Solution To Network Problems

COMPACT design means savings in high-cost space when you use Allis-Chalmers network transformers. Utilities all over the country are choosing Allis-Chalmers as increasing loads put more demands on their downtown network systems. New Allis-Chalmers units are ordered repeatedly to take their place alongside the more than 1½ million kva already installed.

You get unusual flexibility in choice. To simplify application problems, Allis-Chalmers builds all three types: oil-filled, *Chlorextol* liquid-filled, and sealed dry-type.

Investigate all the advantages of compact, reliable Allis-Chalmers network transformer design. Consult your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4781

Chlorextol is an Allis-Chalmers trademark.



Compact, low-loss design. Thermal capacities are high for severe load conditions. Sturdy, time-proved core and coil construction withstands repeated short-circuit stresses of network operation.

Safe, dependable tap-changing mechanism. Handle inserted through two-inch opening on cover operates mechanism. Handle cannot be removed unless it is in positive tap position. Cover location of handle entrance eliminates packing gland maintenance.

Threaded valve connections to tank are solder-wiped for extra protection. Valves are located for easy access. Globe-type valves with nonrotating seats close tight, avoid wear on valve seats.

Spiral-wound gaskets have proved their superiority over other types of gaskets for sealing bushings in the tank wall in over 7 years' continual use. Alternate plies of preformed spring-like metal and nonmetallic fillers provide unusual resilience and actually adjust themselves to changes in operating conditions. Gaskets can be installed without cements or grease. They can be quickly removed if required and may be re-used.

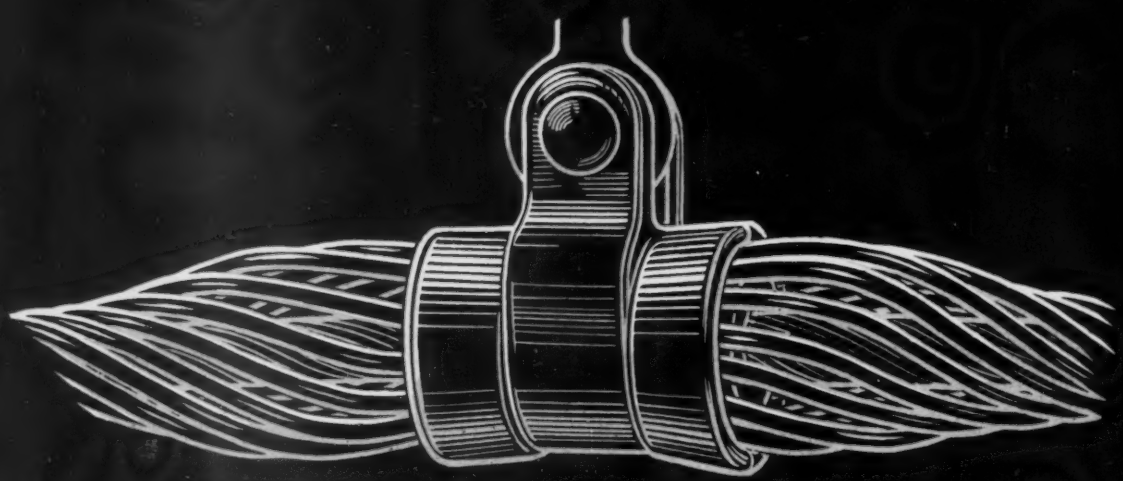
Shot blast cleaning, three coats of baked-on paint formulated for high water resistance, and protective compound treatment of base and tubes in base area give superior surface treatment.

A-C ALLIS-CHALMERS

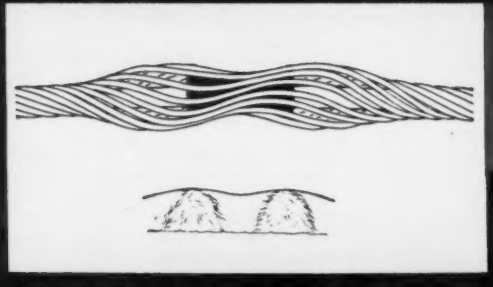
ALLIS-CHALMERS

another PLP first...

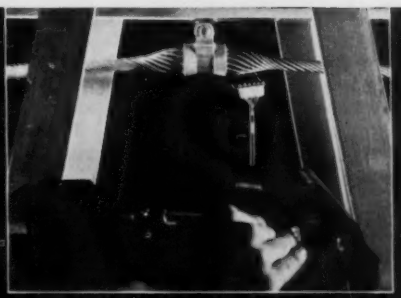
an entirely new concept



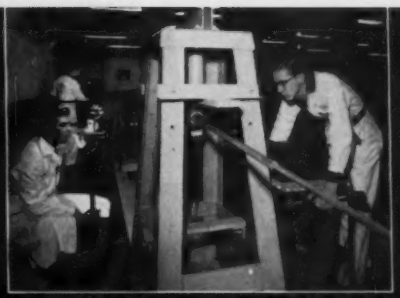
SALES REPRESENTATIVES—**C. B. Anderson Co.,** *Tulsa, Oklahoma City, Amarillo, Lawton* • **Belcher and Associates, Inc.,** *Jacksonville, Miami* • **Bergstrom-Verbarg Co.,** *Minneapolis* • **Vincent J. Brown Co.,** *Buffalo, Syracuse* • **Burns Electric Co.,** *Pittsburgh* • **Carlton Cooley,** *St. Louis* • **F. C. Clatterbaugh,** *Omaha* • **Earl S. Condon Co.,** *Los Angeles* • **Cory and Crum,** *Indianapolis* • **The Electrical Distributors Co.,** *Philadelphia* • **Engineer Sales Co. of Carolina,** *Columbia* • **J. S. G. Electric Co.,** *Chicago* • **E. L. Flowers,** *Westwood* • **George R. Horne and Co.,** *Dearborn, Toledo* • **Johnson Sales Co.,** *Bay City* • **H. L. Macon and Co.,** *Atlanta* • **Peterson Co.,** *Denver* • **Elgin B. Robertson, Inc.,** *Dallas, Houston* • **K. M. Ryals Co.,** *San Francisco* • **Shaffer and Nelson,** *Portland, Seattle, Spokane* • **M. H. Snyder & Sons,** *New York* • **Curtis H. Stout & Co.,** *Little Rock, Memphis, New Orleans, Jackson* • **L. G. Wendegatz,** *Kansas City*



CONDUCTOR FLOATS freely through "clamping" region. A protective "cage" of Armor Rods applied over a cushioning neoprene sleeve eliminates clamping stress.



Accurate checks, like the strain gauge test shown here, record the performance of the ARMOR-GRIP SUSPENSION under vibration. Results prove that vibration stress in all conductor elements is reduced up to 50%.



In the PLP Laboratory, the ARMOR-GRIP SUSPENSION is proven under severe vibration conditions.

in suspension design

After five years of intensive laboratory research and field experience, Preformed Line Products Company announces the ARMOR-GRIP SUSPENSION. This is not just a modification of the conventional clamp—in fact, in a sense it is not a "clamp" at all. The ARMOR-GRIP SUSPENSION is a "floating suspension"—the conductor is cradled in neoprene and firmly gripped only by the custom-designed Preformed Armor Rods which distribute their pressure over a relatively large area. An ingenious relation between rods and housing prevents the suspension assembly from slipping longitudinally. The expanded configuration of the PLP rods also adds rigidity to the conductor while slight vertical resilience of the conductor mounting eliminates a steep stress gradient.

THE ARMOR-GRIP SUSPENSION ELIMINATES CONCENTRATED CLAMPING STRESSES.

In severe accelerated vibration tests, conductor mounted in the PLP ARMOR-GRIP SUSPENSION outlasts conventional clamp assemblies many times—in fact, no conductor failures have ever occurred under the ARMOR-GRIP SUSPENSIONS in these tests. Thousands of ARMOR-GRIP SUSPENSIONS have been installed during the past four years—with NO reported case of unsatisfactory performance.

Yet with all these functional advantages, the ARMOR-GRIP SUSPENSION is very easy to install. Simplicity of design has eliminated many parts—there are less than one-half the number contained in a conventional clamp assembly. Only one nut to tighten.

The ARMOR-GRIP is immediately available in conductor sizes in the ranges of 336,400 cm, 477,000 cm, 795,000 cm, 954,000 cm ACSR and All-Aluminum. Other sizes will soon be available and can be produced on request.

Made in accordance with or for use under one or more of the following U. S. Patents: 2,722,393; 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.

EXPANDING THE PREFORMED ARMOR RODS in the support region greatly increases the rigidity of the conductor just as struts in a frame increase rigidity.

WITHSTANDS SLIPPING UNDER UNBALANCED SPAN LOADS. Conical shaped armor rod "saddle" seated in contoured casting prevents conductor shifting in assembly. Only cushioning neoprene contacts conductor at support center. Conductor is gripped only by PLP Preformed Rods which distribute pressures over large conductor areas.

CORONA AND HEAT LOSSES. The ARMOR-GRIP is symmetrically designed and radiused—with no protuberances—thus eliminating a source of corona emission and radio influence. The metal componenrs are all-aluminum alloy—there are no magnetic heat losses.

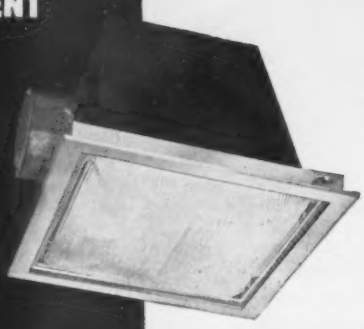
PREFORMED LINE PRODUCTS COMPANY

5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO

TELEPHONE: CLEVELAND EXPRESS 1-3571

NEW CURTIS SCHOOL CORRIDOR LIGHTING UNITS

INCANDESCENT SQUARE RECESSED



A square recessed incandescent downlight that can be recessed into a 12″ opening in any type ceiling construction.

This new Curtis recessed unit is for use with either 150-W, 200-W or 300-W incandescent lamps. A specially designed lamp holder plate permits easy adaption for correct positioning of these three different wattage lamps. The hinged door accommodates either a variety of lenses or a louver. Units pass Underwriters approval when installed singly or when grouped or patterned together.

PRINCESS CORRIDOR LUMINAIRE

A new completely enclosed Fluorescent Luminaire for 4′ and 8′ Rapid Start or Slimline lamps.

This completely enclosed luminaire is ideal for corridors and other areas where wide light distribution is desirable. The white plastic polystyrene plastic panels may be easily removed for cleaning or lamp replacement. Units may be installed individually or in continuous lines, close-ceiling or pendant mounted.

LOUVERED CORRIDOR LUMINAIRE

A distinctive Fluorescent Luminaire, with attractive white enameled steel louvers for 4′ and 8′ Rapid Start or Slimline lamps.

This new Curtis all steel luminaire is finished white baked Fluracite enamel. It is a highly efficient direct unit designed to give 25° lengthwise shielding. The louver is hinged from either side for fast, easy re-lamping or cleaning without the use of tools. Units may be close-ceiling or pendant mounted individually or in continuous lines.

Write Dept. B16-CP for complete, descriptive literature on these new Curtis corridor units.

CURTIS

CURTIS LIGHTING, INC.

6135 WEST 65th STREET CHICAGO 38, ILLINOIS

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LIVE BETTER

Elec

Coming soon—very soon—the greatest residential load-building drive the electrical industry has ever known.

Its theme?
LIVE BETTER . . . ELECTRICALLY.

Its objective? To sell *all* the benefits of electrical living, and increase residential load. It will directly benefit everyone connected with the electrical industry—utilities, manufacturers, distributors, dealers, contractors and trade allies.

You'll be hearing more about it soon.

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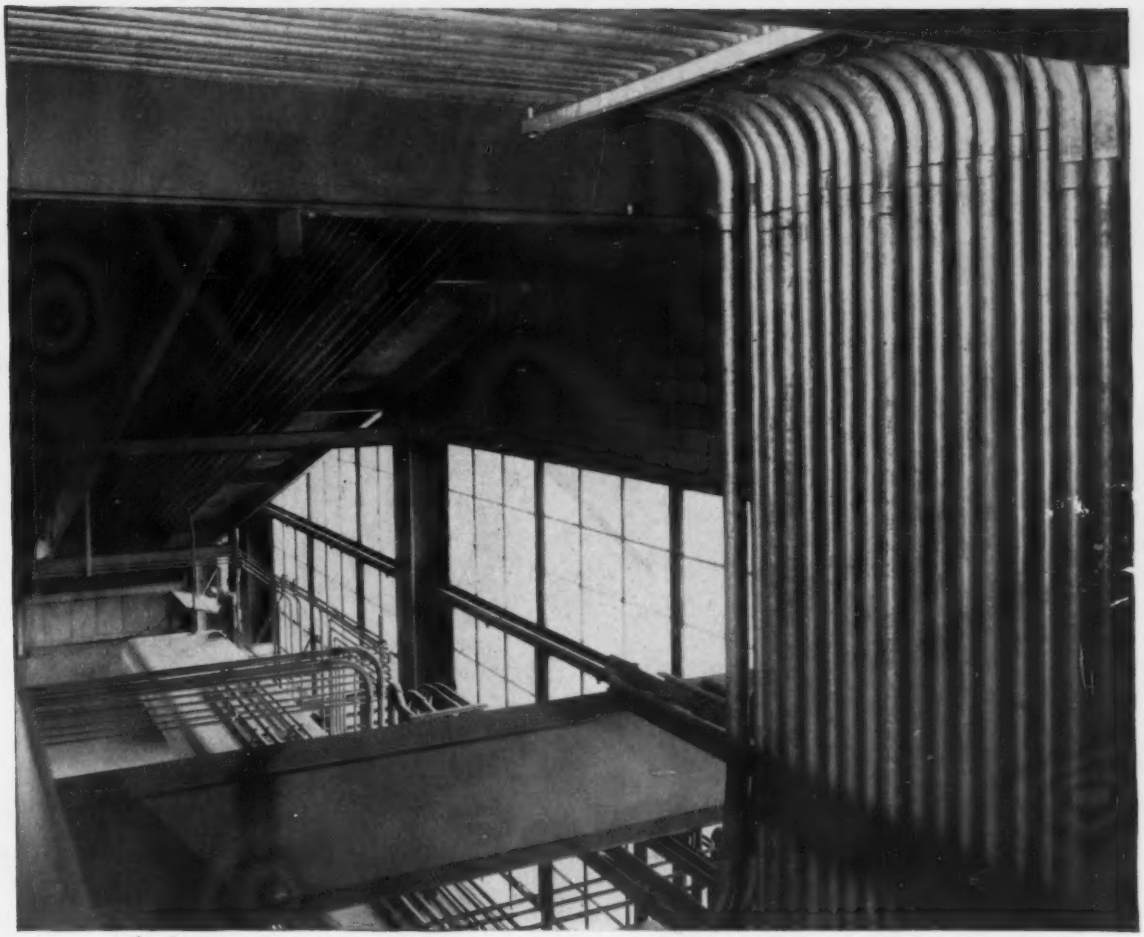
LIVE BETTER
ELECTRICALLY



WHY *contractors* LIKE YOUNGSTOWN CONDUIT

• They know it's easy to bend. Easy to thread. Easy to handle and install, especially in cramped or small spaces. And its smooth, inside finish speeds up wire-pulling and results in easier, faster installations.

Wiring in Youngstown rigid steel conduit is safe. It gives protection against damage from moisture, vibration, dust, dirt and crushing. The job is safe. And so is your reputation.

On your next job, don't take chances. Be sure there's no waste. Make sure you get the savings you should, all down the line. Ask your distributor for Youngstown Buckeye Conduit. Approved by the National Electrical Code for all hazardous locations. Buckeye electrical conduit is produced from ore to finished product by one manufacturer — Youngstown.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

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OFF WITH THE OLD...ON WITH THE NEW

The Form W transformer being hoisted off the line is one of the last of thousands like it which are giving dependable service on hundreds of distribution systems. The new design Form W transformers, shown at the left, are built to give the same dependable service, with the added advantage of being substantially smaller and lighter.

Wagner Form W Transformers are up to 17% lighter... 18% shorter

Even before the newest trend to lighter, shorter transformers, Wagner's famous Form W construction made it possible for Wagner to build small-size, light-weight distribution transformers. Now, Wagner engineers have redesigned Form W transformers in ratings 15 through 167 Kva, 15 KV and below, with improvements in core and coil construction that make possible reductions up to 17% in weight and 18% in the important overall height dimension.

For example, the old design 50 Kva transformer shown at the left weighs 895 pounds and measures 45 inches in height; the new 50 Kva transformers, also shown, are 145 pounds lighter and 5 inches shorter.

When you specify these new Wagner transformers, you can save money by putting greater transformer capacity on your existing structures. All ratings through 167 Kva can be pole mounted.

IMPROVED INSULATION A special resin coated insulating material is used for layer, channel and barrier insulation. After heat treating, the resin varnish bonds the coil conductors and insulation together to give the coils exceptionally high mechanical and electrical strength.

MECHANICAL FEATURES In the 25, 37½ and 50 Kva ratings, cooling fins increase the radiating surface. The 75, 100 and 167 ratings are provided with tubes.

The rating of each of these new transformers is clearly shown on the tank.

There are fewer sharp edges and brackets on the tank where rust can start . . . lifting lugs are curved and rounded.

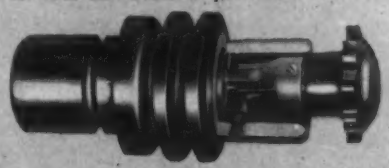
These new, lighter, shorter Form W Wagner transformers will meet your requirements. Full detail are yours in Bulletin TU-180.

SHUR-SEAL CLAMPING RING

Keeps transformer sealed air-tight . . . no atmospheric moisture or dust particles can get inside.

HIGH VOLTAGE SIDEWALL BUSHING

For use with either copper or aluminum conductor . . . safety-designed for faster, easier connections, without tools. Porcelain and terminal are locked in position.



INHIBITED OIL—reduces oxidation to a minimum . . . retards formation of acids and sludge.

LOCKED LOW VOLTAGE BUSHING

The bushing and terminal are key-locked to prevent rotation . . . no loose terminal connections to cause internal shorts. Suitable for copper or aluminum conductor.

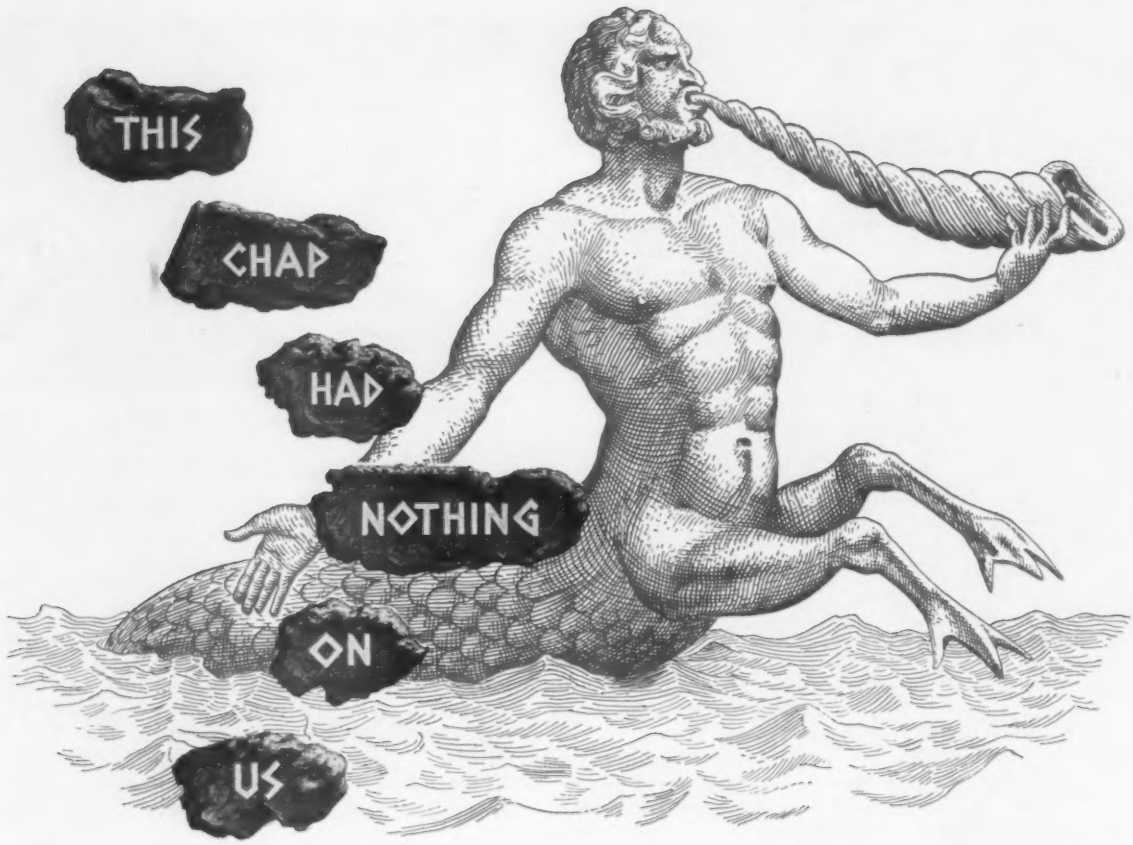
Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

T56-1

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES



He's Proteus, Neptune's son, a highly versatile character—hence the adjective *protean.* You never knew whether next you'd see him as a lion, a raging fire, a reptile, or an angry bull.

Here at Driver-Harris, we do protean marvels too . . . with *metals.* For instance, Nichrome*, the unique heat-resistant, corrosion-resistant, electrical-resistance alloy known the world over, has long been the engineer's yardstick of comparison not in one, but *in at least 3 widely different applications.*

TO GENERATE HEAT: In all applications of producing heat by electricity, particularly to temperatures above 1700°F., Nichrome and Nichrome V set the quality standard. From simple electrical appliances such as ranges, broilers, toasters, etc. to giant industrial furnaces, no other alloys enjoy such widespread recognition and use.

TO RESIST HEAT: Because of its unsurpassed resistance to heat and corrosion, Nichrome is used for making massive furnace muffles and retorts often weighing tons, and work-loading fixtures of all shapes. The outstanding property of Nichrome here is its extremely long life, which results in low heat-hour costs.

TO RESIST ELECTRICITY: The greatest contribution to outstanding stability and miniaturization of resistors is made by Nichrome wire. Drawn to sizes as small as .0005 and finished in a variety of insulations, Nichrome is a boon to electronics in the manufacture of high tolerance resistance units of all types.

Added to the nickel and chrome of Nichrome and Nichrome V is always one exclusive ingredient—the supreme mastery of the Driver-Harris specialists, gained in their 57 years of melting and drawing experience.

In recognition of its unique properties, the United States Patent Office in August, 1908, granted solely and exclusively to us the trademark NICHROME. There is *only* one Nichrome, and it is made only by Driver-Harris.

*T. M. Reg. U. S. Pat. Off.

SPECIAL PURPOSE ALLOYS SINCE 1890 — D/H — TRADE MARK REG. U. S. PAT. OFF.

Driver-Harris Company

Western Representative: **ANGUS-CAMPBELL, INC.**

4417 S. Soto St., Los Angeles 58 917 Bryant St., San Francisco 3

Main Office and Plant: HARRISON, NEW JERSEY

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD

YOU CAN TELL BY THESE LABELS
SUNBEAM visionaire LIGHTING COMPANY
Volts 60 Cycle A.C.
AMPS WATTS
HIGH POWER FACTOR
LOS ANGELES, CALIFORNIA
These labels on Sunbeam Visionaires assure you of the highest long-lasting quality, illumination efficiency and electrical perfection available in lighting fixtures.
SUNBEAM RLM
PROTECTED BY Bonderite QUALITY CORROSION RESISTANT
Underwriters' Laboratories, Inc. INSPECTED ELECTRIC FIXTURE ISSUE 11-7
A6CT39104
Underwriters Laboratories Inc. INSPECTED RECESSED TYPE ELECTRIC FIXTURE ISSUE NO. 673/1
SUNBEAM
LIGHTING COMPANY, 777 EAST 14TH PLACE, LOS ANGELES 21

MUSHROOMING LOADS like this all-air-conditioned department store at a new Levittown shopping center have created a load growth problem for the Long Island Lighting Company.

How Long Island Lighting Pares Cost of Future Secondary Network System

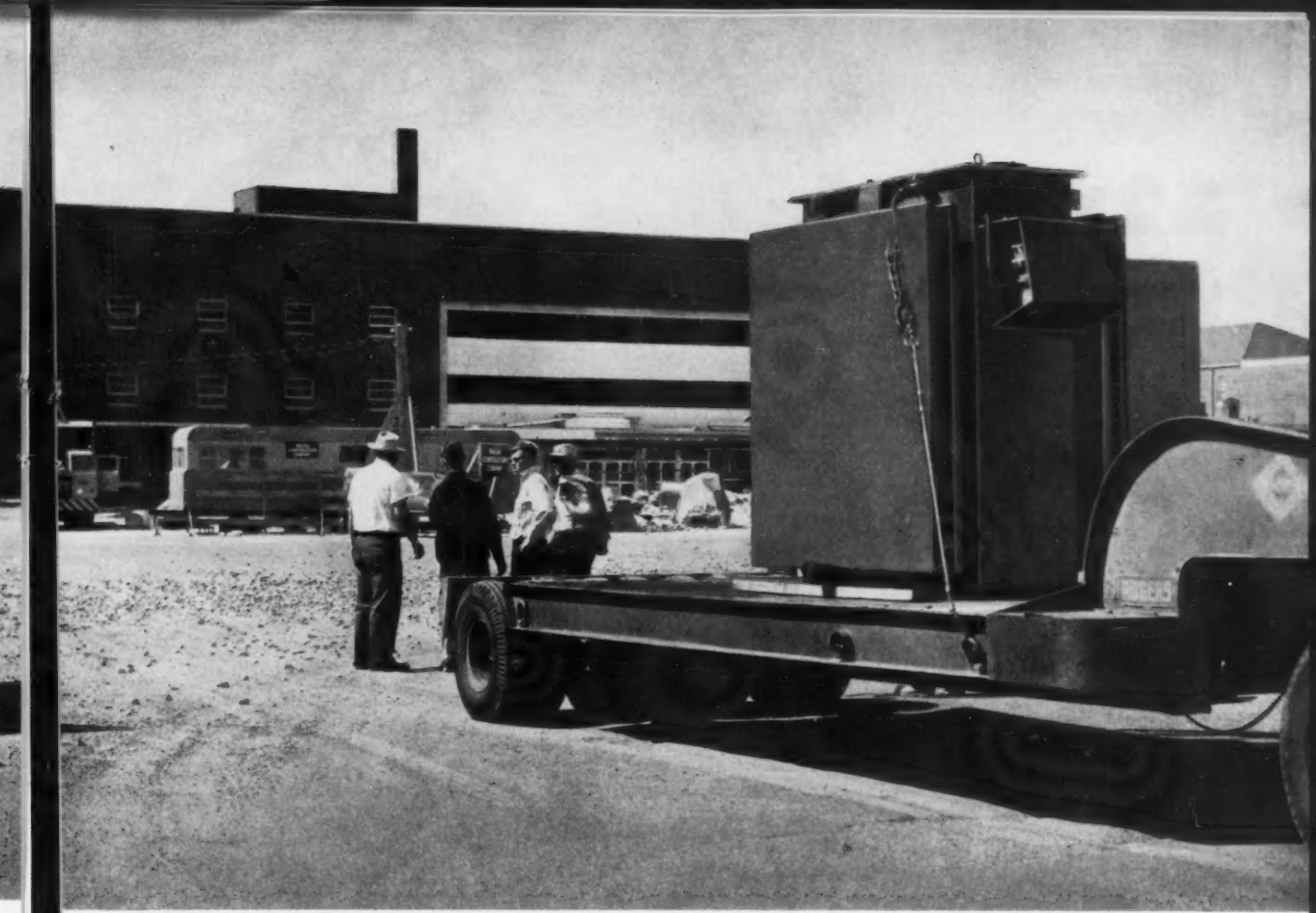
TREMENDOUS EXPANSION of both residential and commercial building load on Long Island makes it necessary to plan far ahead. A secondary network seems to be inevitable in some of the newer commercial areas serviced by the Long Island Lighting Company of Mineola, N. Y. Recognizing this problem, Long Island Lighting is already planning on how to cut costs of its *future* network system.

Even though new areas are still served by a radial system, the utility is installing G-E *network* transformers to handle concentrated loads in new shopping centers, like the all-air-conditioned department store at Levittown. When a secondary network becomes necessary, many of the vaults will already be equipped with network transformers and only network protectors will have to be added . . . giving a considerable saving on ultimate installation and rearrangement.

OTHER BENEFITS come from this advanced planning. Congested overhead wiring is eliminated. Better service continuity results from underground service. Greater dependability is obtained from submersible G-E network transformers . . . with their new panel-type radiators that minimize corrosion and facilitate maintenance, and particularly cleaning and repainting.

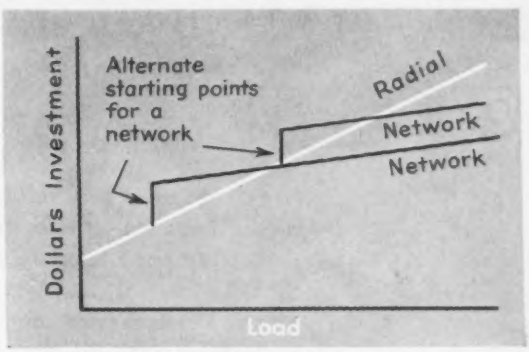
HELP FOR YOUR SYSTEM. If you are planning to meet continued load growth with a radial system and your load density can be expected to reach 50 to 100 kva per 100 feet of street within the next ten to fifteen years, now is the time to investigate the advantages of a secondary network.

G-E district engineers will be glad to help you compare the costs of your present system and the potential savings possible with a network. For full details, write to Section 435-9, for Bulletin GET-2432. General Electric Company, Schenectady 5, N. Y.



FUTURE CONVERSION TO NETWORK SYSTEM is facilitated by the installation of this G-E network transformer with "panel-type" radiators. When the secondary network system becomes a reality, the only additional equipment necessary will be the installation of network protectors.

PLACED IN AN HOUR under the shopping-center parking lot, this 1000-kva 13,200–216Y/125 unit can weather submersion if lot should become flooded.



IT PAYS TO START A NETWORK. Future increases in capacity require less investment with a network. The sooner it is started, the lower the ultimate cost.

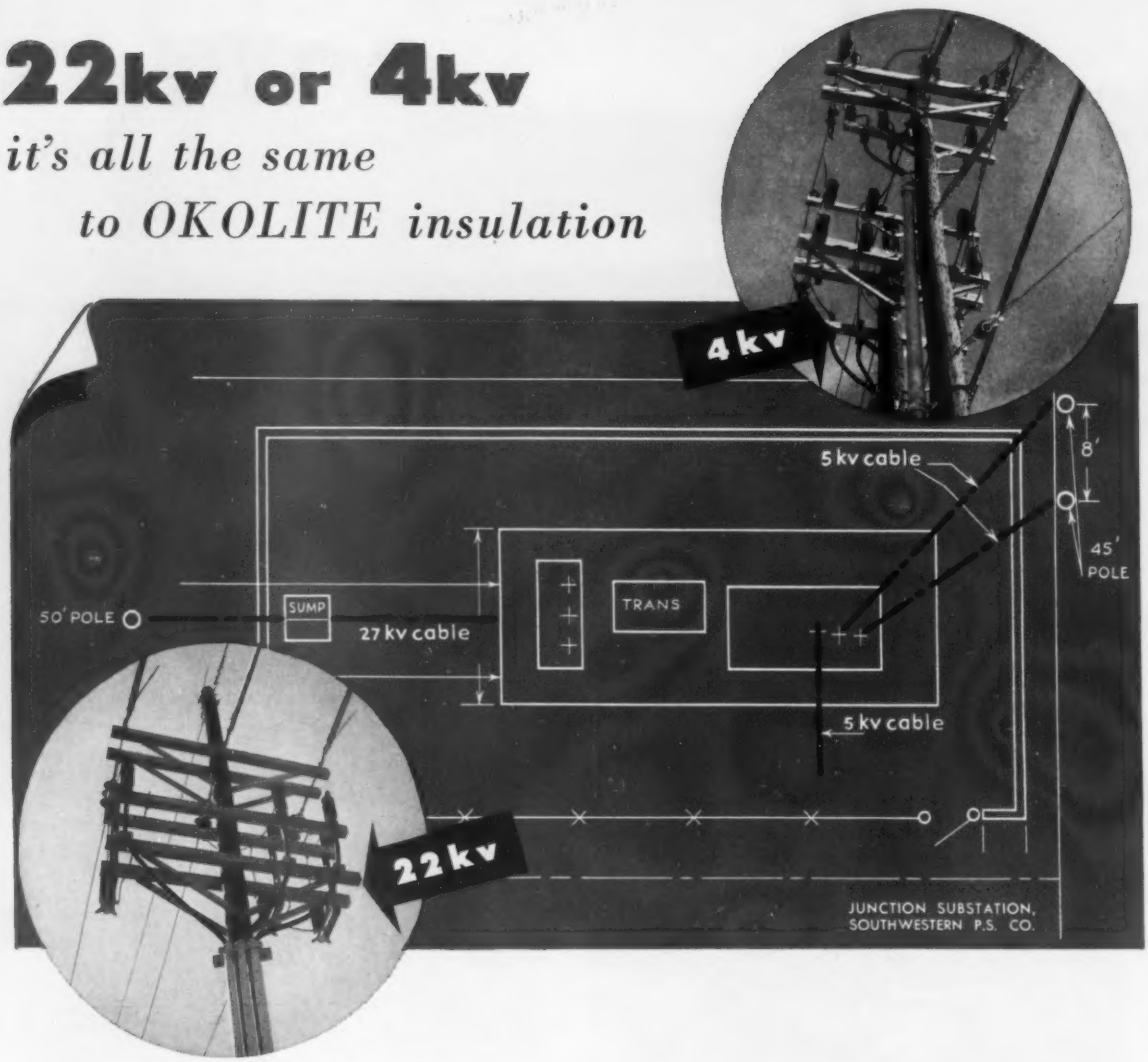
Progress Is Our Most Important Product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose Seattle, and Richland, and Sales Offices in twenty Western cities.

22kv or 4kv

it's all the same to OKOLITE insulation



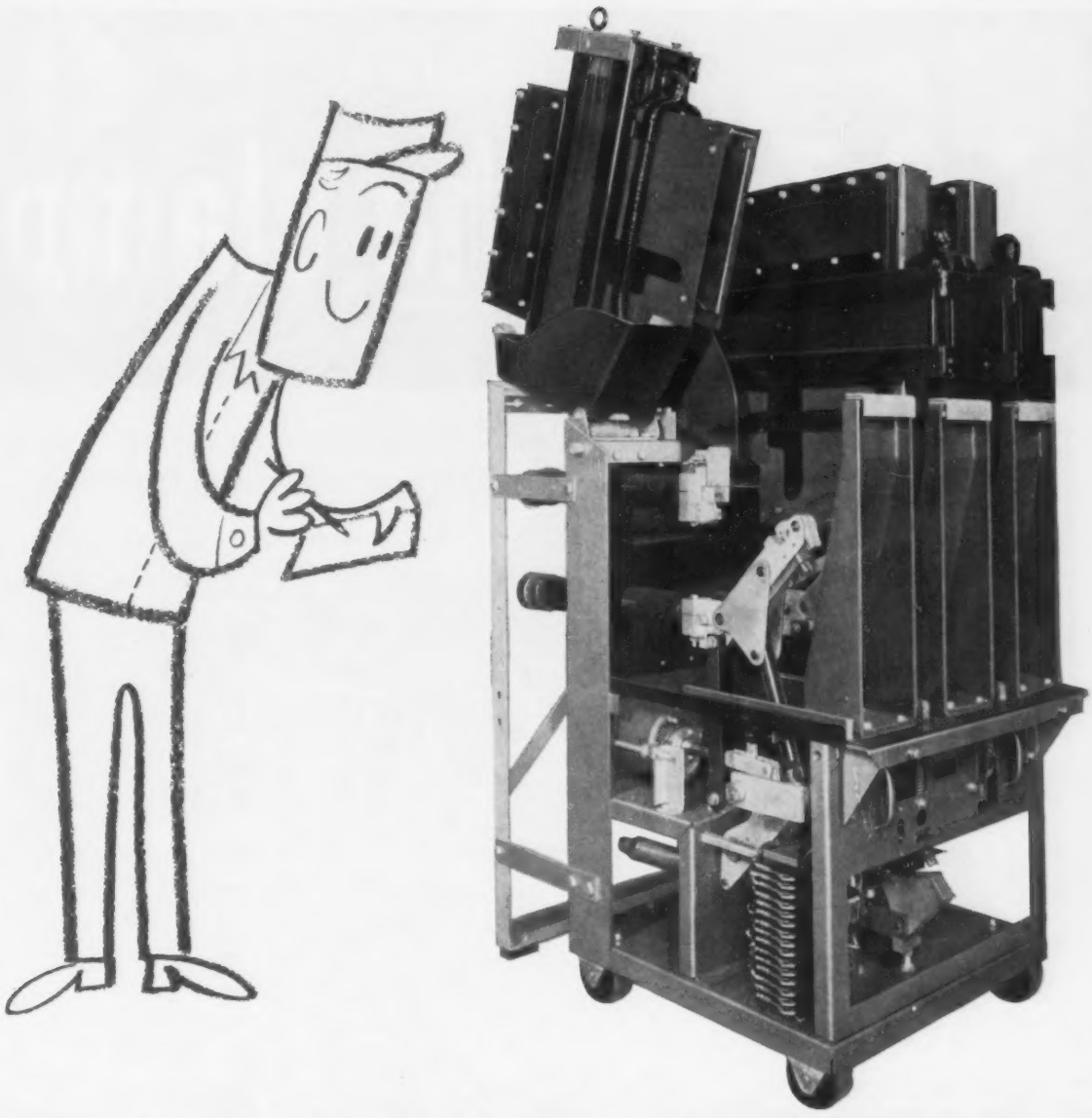
High voltage or low voltage—Okolite rubber insulation provides maximum dependability and utmost safety. Here at the Junction Substation of the Southwestern Public Service Company in Lubbock, Texas, both the 4kv and 22kv circuit risers are Okolite-insulated, Okoprene-sheathed cables.

Okolite-Okoprene cables have an outstanding reputation for reliability in circuits up to 35,000 volts. Okolite-Okoprene is easy to handle and cuts installation costs; the problem of oil migration is nonexistent and splices and terminations require less time and labor.

Write today for Okonite's complete handbook on rubber-insulated, high-voltage cables, Bulletin WE-1075. It contains complete engineering and installation information for circuits up to 35,000 volts. The Okonite Company, Passaic, N. J.

OKONITE OKONITE SINCE 1878 ***insulated cables***

2304



SEE VALUE HERE YOU'LL SEE NOWHERE ELSE

Operating engineers in the electrical industry often say you can see the higher quality in I-T-E switchgear even when you stand 'way back.

Of course, they're only partly right. You can easily see the practical component arrangement, the all-welded steel construction with compartments designed to retain shape even when lifted as a unit, and the clean, neat appearance. These are standard on all I-T-E switchgear.

But we want you to look closer—see even more. For example, in Metal-Clad Switchgear: the easy-to-service horizontal drawout design; the tilting arc chutes; the extra-heavy insulation. There's quality in every detail—quality that means dollars' more value for your switchgear investment and years' longer troublefree service.

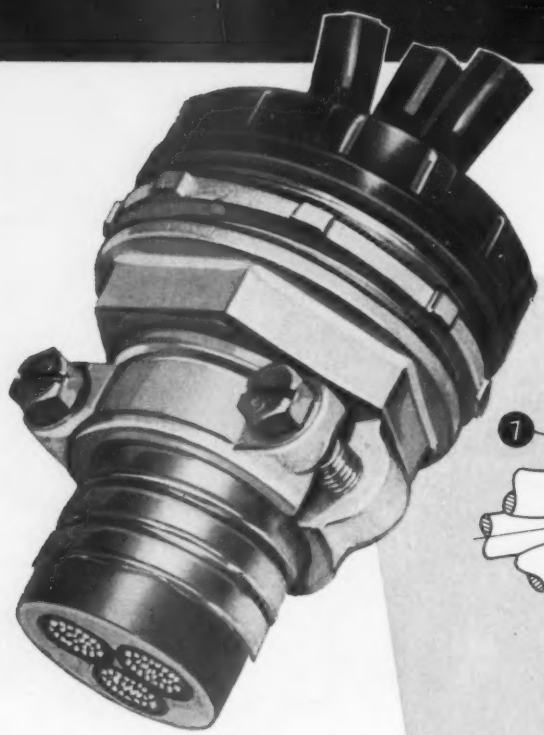
Why not phone the I-T-E office nearest you. Or write for bulletin 7004 giving a complete description of 5, 7.5 and 15 kv switchgear. I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Phila. 30, Pa.

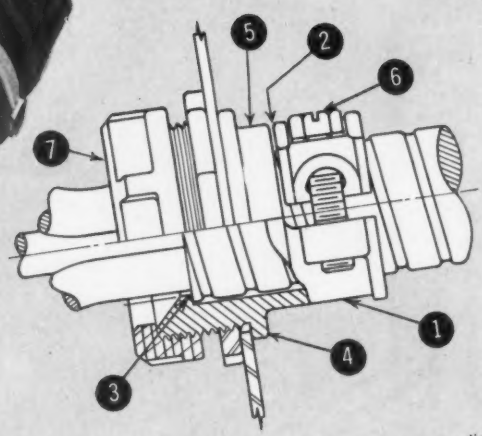
I-T-E

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

from every angle–

O.Z. TYPE "PK" is the clamp





1. Cadmium-plated malleable iron body and clamping cap for strength and corrosion resistance.
2. Armor clamped several turns from end.
3. Smooth armor stop assures termination at proper point—protects cable insulation from sharp, rough edges.
4. Flange on body eliminates locknut outside of cabinet.
5. Large hex facilitates installation.
6. Slotted hex-head clamping bolts can be tightened by wrench or screwdriver.
7. Strong O.Z. Type A hi-impact phenolic insulating bushing.

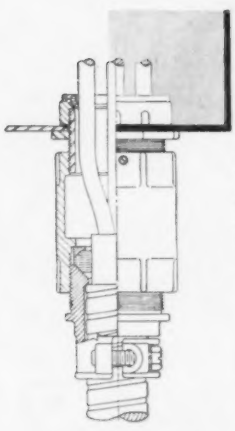
Here is a clamp designed specifically to meet the requirements of interlocked armor cable applications. The O.Z. Type "PK" Clamp provides exceptional speed and ease of installation, whether your cable enters the cabinet from the top, bottom or side. It is designed with ample thread length for use with all standard conduit fittings and terminators from 1" to 5" and is available for interlocked armor cable ranging in size from .99" to 4.38" O.D.

Call your local O.Z. Distributor.

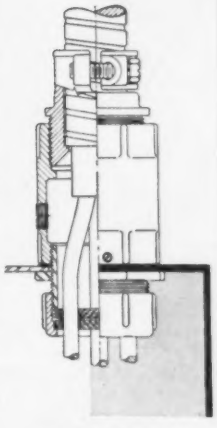
for ARMORED CABLE

combines with standard O.Z. fittings for any terminating or splicing job involving INTERLOCKED ARMOR CABLE.

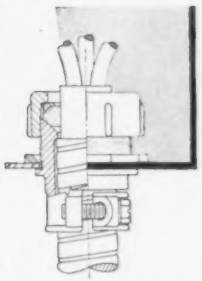
Seals cable ends to protect insulation against moisture and other contaminators—can also be used with threaded hubs and bosses to provide watertight cable entrances.



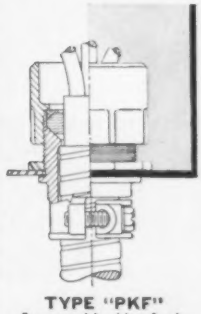
TYPE "PKC"
Terminator for interlocked armor cable entering bottom of cabinet.



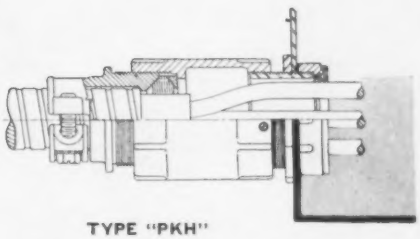
TYPE "PKT"
Terminator for interlocked armor cable entering top of cabinet.



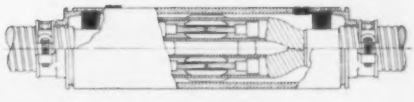
TYPE "PKG"
Sealing bushing for interlocked armor cable entering a cabinet.



TYPE "PKF"
Compound bushing for interlocked armor cable entering bottom of cabinet.



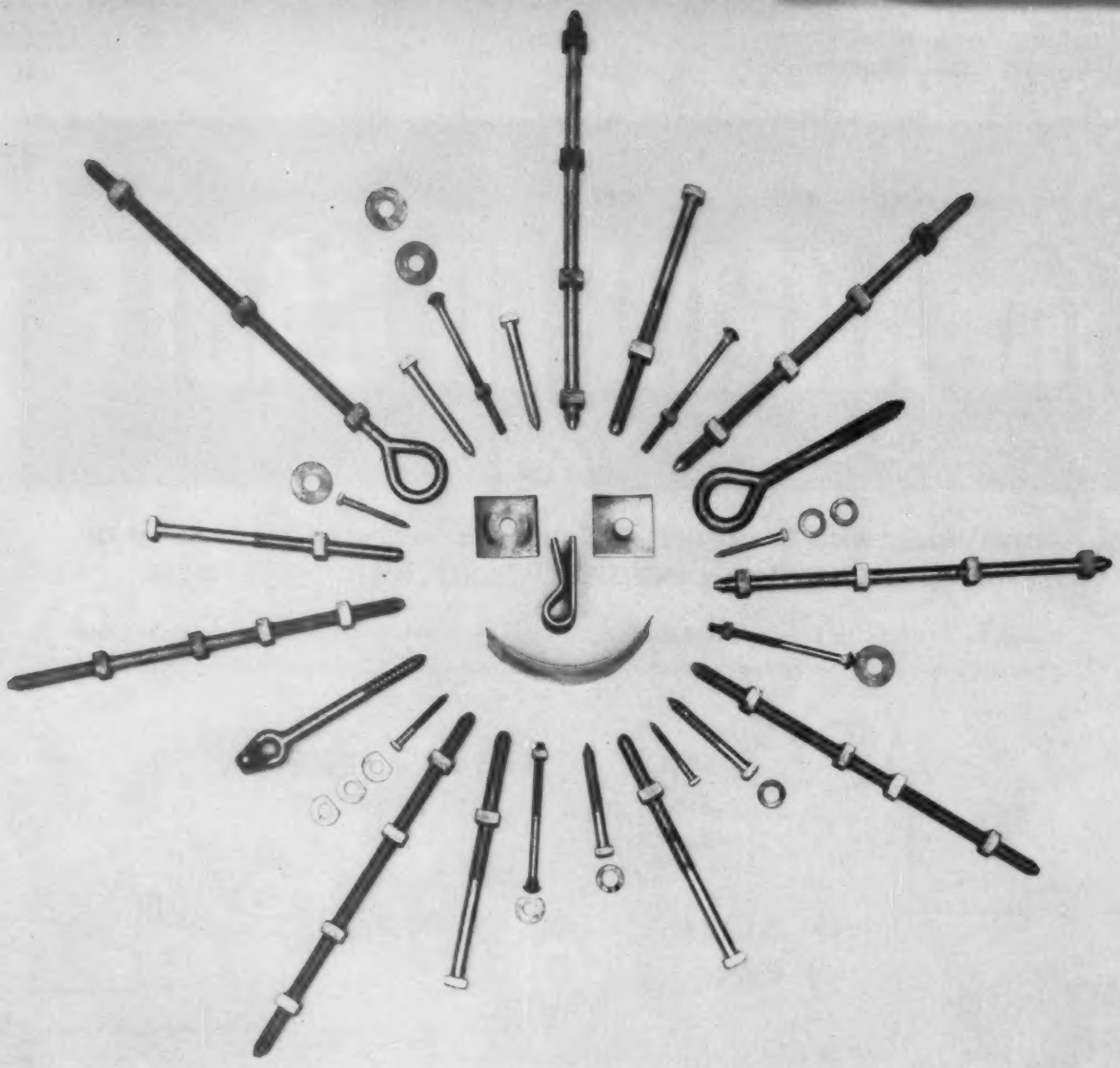
TYPE "PKH"
Terminator for interlocked armor cable entering side of cabinet.



TYPE "PKS-J"
Splicing chamber for interlocked armor cable.

O.Z. ELECTRICAL MANUFACTURING CO., INC.
262 BOND STREET • BROOKLYN 17, N. Y.

CAST IRON BOXES
CABLE TERMINATORS
POWER CONNECTORS
SOLDERLESS CONNECTORS
GROUNDING DEVICES
CONDUIT FITTINGS



Mainstay

These commonplace items . . . bolts and nuts, screws and washers . . . are the backbone of Hubbard's more than 4,000 items of pole line hardware. Back of each is more than a century's manufacturing experience. In each is the strength and durability, the uniformly high quality that has made Hubbard the leader of pole line hardware for industry.

Hubbard Pole Line Hardware is stocked by more than three hundred wholesalers . . . men whose business it is to know and service local needs. A call to your Hubbard distributor will bring his helpful assistance to your line construction needs.

QUALITY—FOR MORE THAN A CENTURY

OVERHEAD—Cable Suspension Material • Wireholders • Pole Seats and Balconies • Clevises • Braces • Drive Hooks • Messenger Dead Ends • Extension Arms • Long Span Hardware • Pins • Clamps • Guards • Stubbing Bands • Guy Protectors • Guy Clamps • Pole Struts • Clips • Straps • Hangers • Carriage Bolts • Transposition Brackets • Eye Bolts • Pole, Corner and House Brackets • Guy Hooks • Strain Plates • Storm Guy Straps • Lags • Machine Carriage and Hubeye Bolts • Sidewalk Guys • REA Telephone Hardware

UNDERGROUND—Cable Racks • Manhole Ladders and Steps • Pulling-in Irons • Cable Shields • Screw Steelwing Anchors • Anchor Rods • Ground Rods and Clamps

HUBBARD AND COMPANY

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Chicago 50, Ill.
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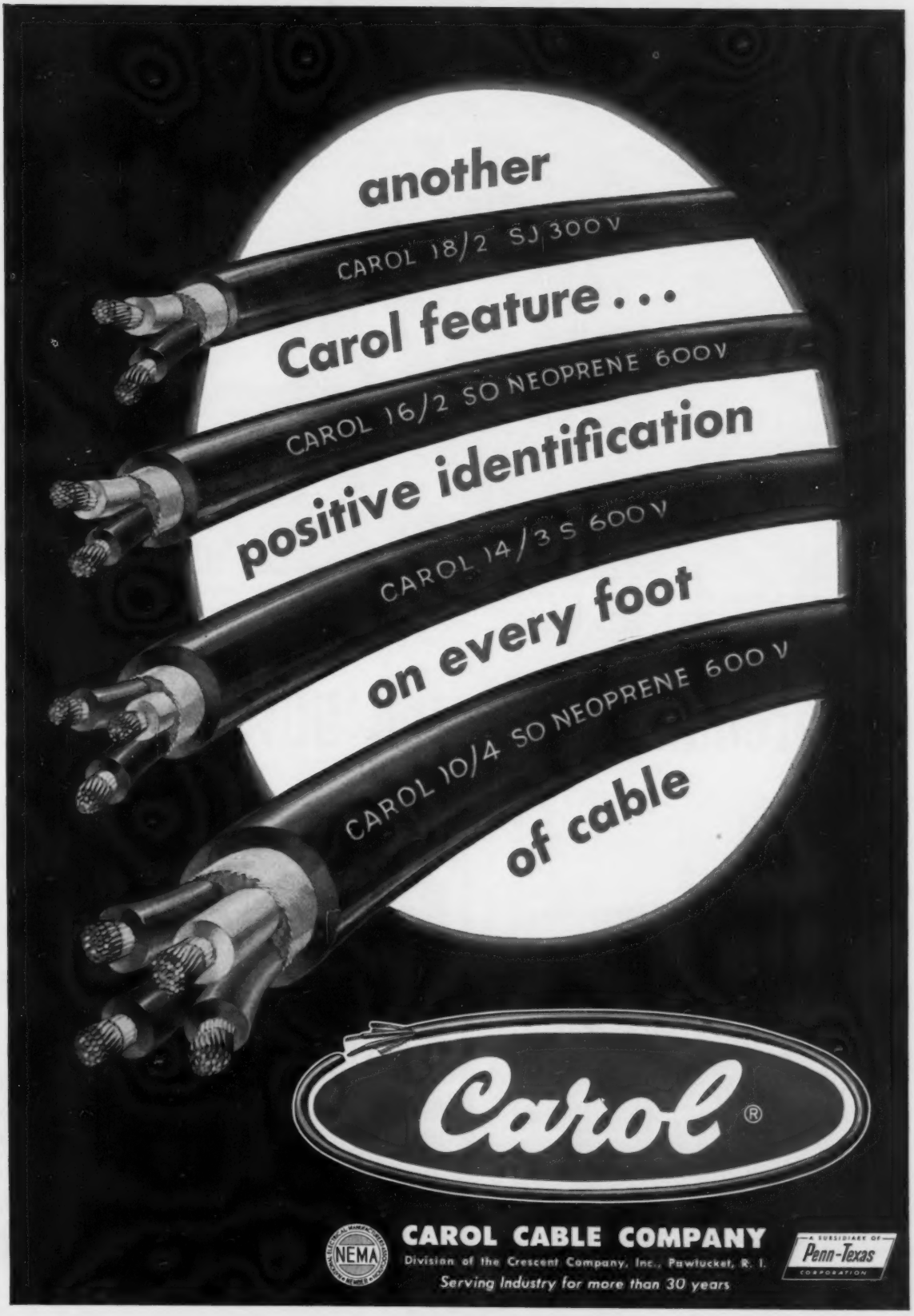
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CAROL 18/2 SJ 300 V
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positive identification
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on every foot
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Serving Industry for more than 30 years
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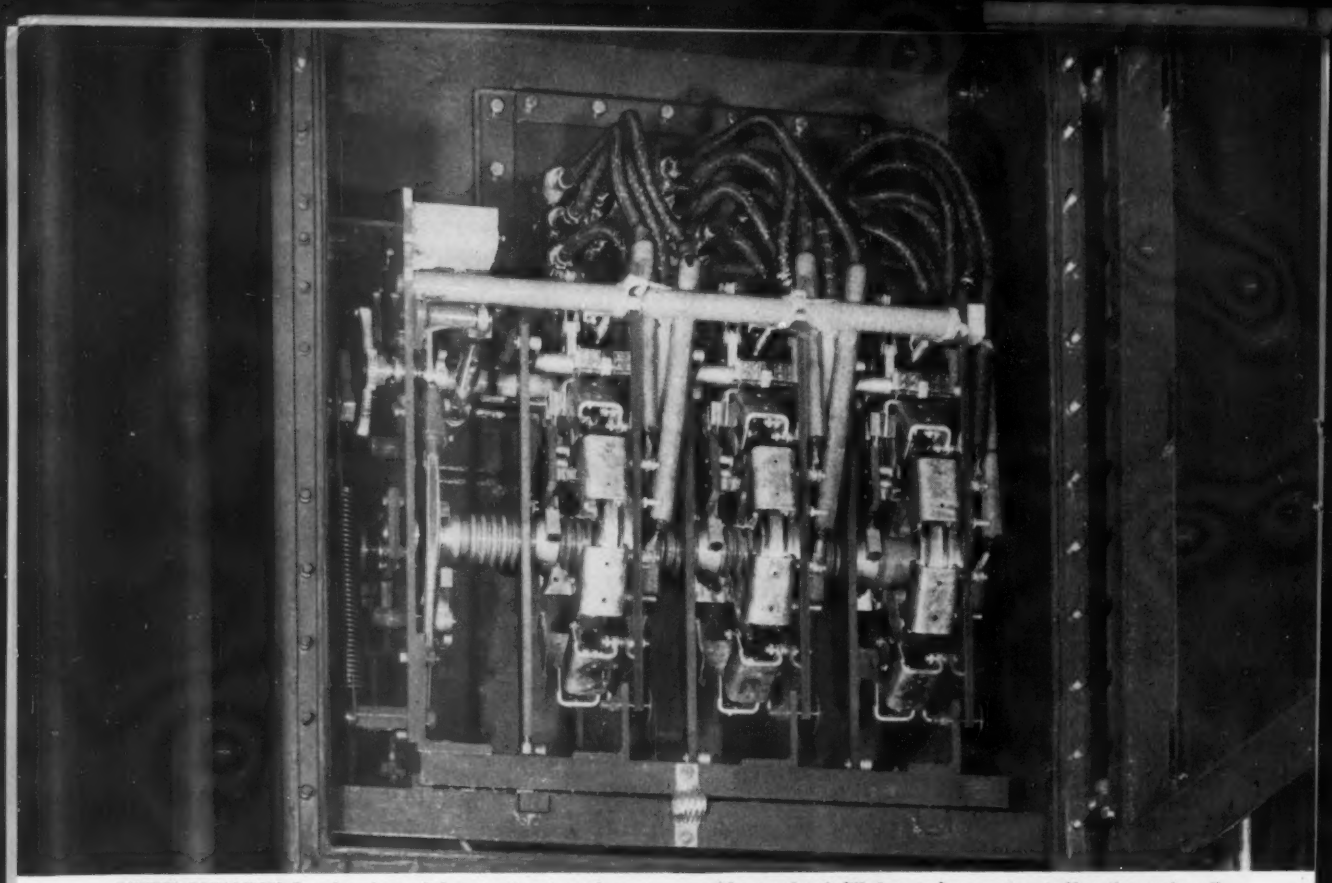
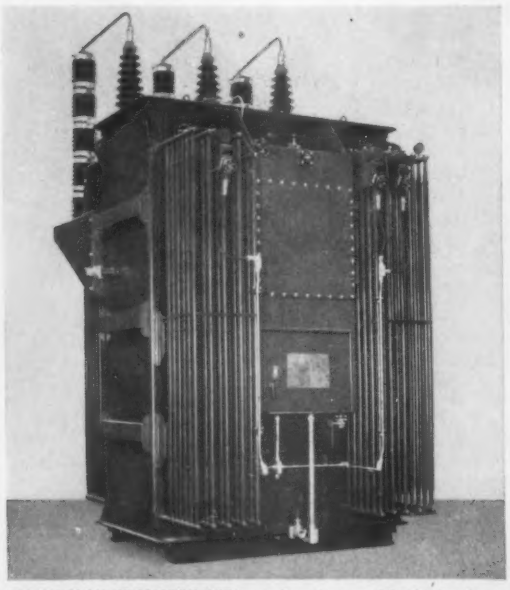
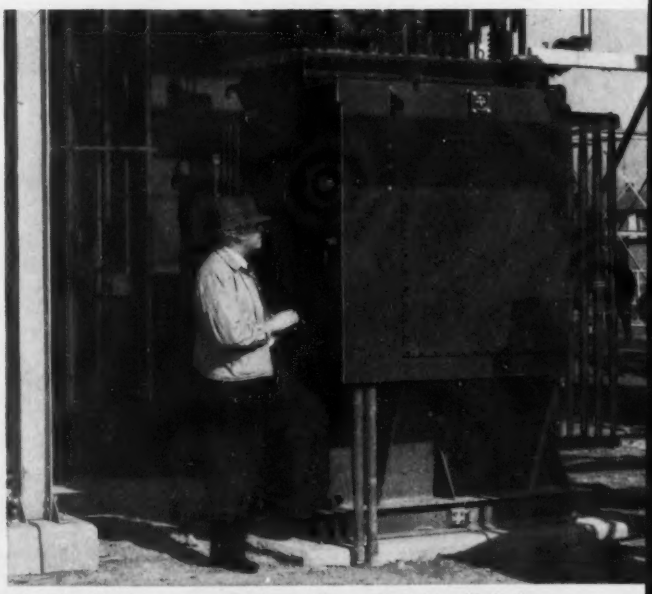


QUIETER OPERATION. Tap-changing switch compartment now houses motor and drive assembly completely immersed in oil to muffle noise and provide permanent lubrication. Formerly, motor plus assembly was in air-filled control compartment. Mounting under oil, and redesigning of geneva gear for smooth driving-pin entry—without impact—has cut peak noise level about 20 db.

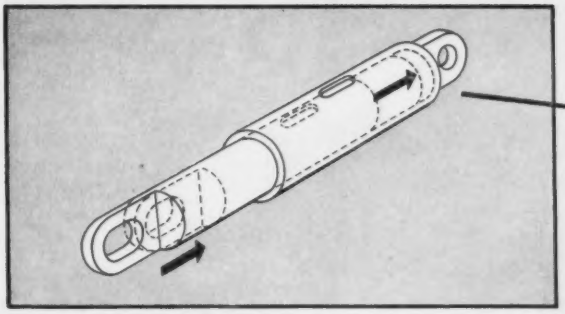
Maintenance reduced 50% by new



RM MEDIUM TRANSFORMERS employ the new LRT-68 load-tap-changing switch in LTC models.

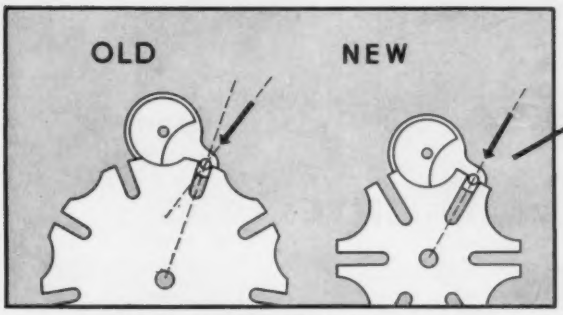


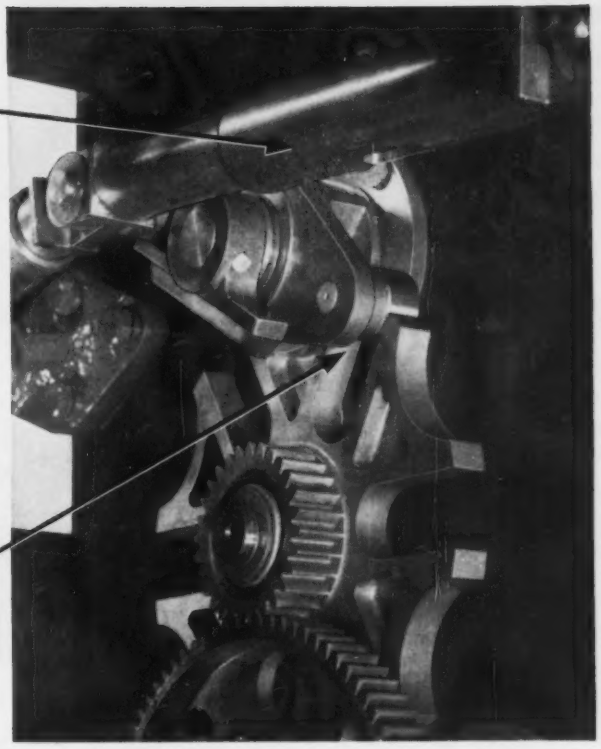
STEP REGULATORS up to 1000 kva will now have the added advantages of the new LRT-68 load-tap-changing switch.



HYDRAULIC DASHPOT

NEW GENEVA GEAR





REDUCED MAINTENANCE. LRT-68 incorporates new hydraulic dashpots and redesigned geneva gear. The two dashpots provide (1) optimum contact separation speed, and (2) reduced engagement velocity, for minimum contact erosion and less secondary arcing.

Geneva gear driving-pin now enters gear slot smoothly, parallel to the side of the slot. Previous design entered at 19° angle. Gentle acceleration and deceleration reduces jarring and mechanical wear. This, plus thicker contact tips, results in 100% increase in tip life.

General Electric load tap changer

Peak operating noise cut 20 db with LRT-68 switch now used on RM transformers and three-phase step regulators

DOUBLED CONTACT LIFE of General Electric's new LRT-68 load-tap-changing switch means routine inspection and maintenance can be *cut in half* on G-E LTC Medium Transformers, and on three-phase step voltage regulators up to 1000 kva.

These savings have been made possible by:
(1) reducing the amount of contact wear per operation, through redesigning the geneva gear (providing smoother operation) and adding hydraulic dashpots (for optimum separation and engagement speeds) and (2) using heavier, thicker contact tips, from which more material can wear before replacement is necessary.

REDUCED OPERATING NOISE results from a complete redesign of G.E.'s load-tap-changer. This means increased consumer good will and less investment in sound-absorbing walls and barriers, when LTC equipment is installed in residential areas.

For full information on this new load-tap-changing mechanism and the medium transformers and three-phase, step voltage regulators on which it will be used, contact your nearest General Electric Apparatus Sales Office, or write Section 416-4, General Electric Company, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

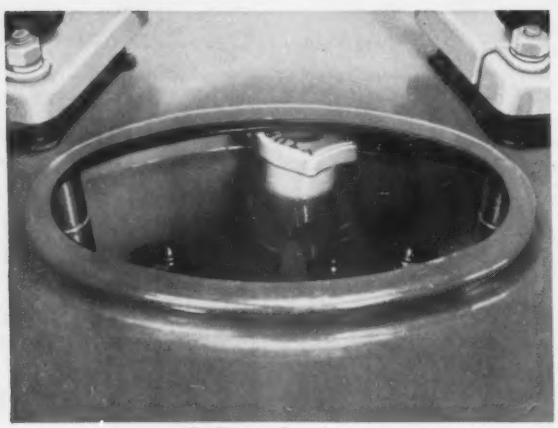
The Big News for '56

IN THE YARD

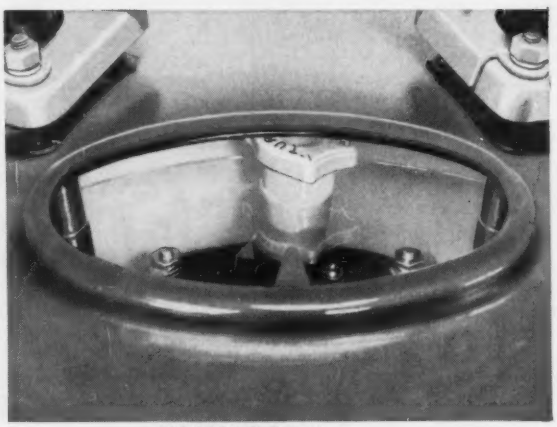
Quick, Sure Inspections

ON THE POLE

MADE EASY WITH EXCLUSIVE KUHLMAN Clearvue INTERIORS



Ordinary Interior



CLEARVUE Interior

You can simplify and speed accurate transformer inspection—in the yard or on the pole—with the exclusive **KUHLMAN CLEARVUE** Interiors.

The value of **CLEARVUE** interiors is dramatically illustrated in the photographs above. Ordinary interiors are difficult to work in, even under good light conditions. With the gleaming **KUHLMAN CLEARVUE** interiors, even the immersed transformer components are sharply visible. This clear view insures correct, fast changes of taps or leads in either bright sunlight or flashlight.

Introduced less than a year ago, **KUHLMAN CLEARVUE** transformers are being specified by increasing numbers of progressive utility operators. They realize that time can be saved and inspections improved when **KUHLMAN CLEARVUE** transformers are used. Make the **CLEARVUE** comparison yourself . . . or let your **KUHLMAN** representative demonstrate the improvement that it makes. And, when you're buying, remember that **ONLY KUHLMAN** distribution transformers have the proven **CLEARVUE** interiors.

KUHLMAN ELECTRIC COMPANY

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SOAPSTONE OCT-O-DUCT

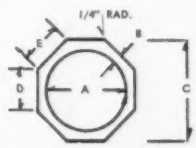
STACKS UP BEST IN EVERY WAY

Because it has flat sides, Soapstone OCT-O-DUCT is easier to handle . . . stacks up best in the trench.

It stacks up best on the profit sheet, too. For more than 25 years leading electric and telephone companies, underground contractors and government bodies have proved OCT-O-DUCT's unique features mean lowest installed cost and trouble-free performance.

When you specify underground conduit, remember these money-saving features:

- Lowest delivered cost of any first-grade underground conduit
- Flat sides eliminate need for expensive spacers
- Easiest to handle in the trench — fastest to lay
- Smoothest bore — lowest coefficient of friction
- Trench-side delivery
- Simple couplings require no tools
- Wide range of sizes, fittings, bends and adapters



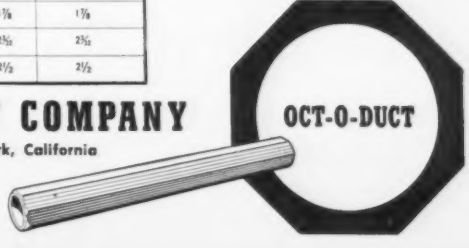
A (I.D.)	B (WALL)	C (WIDTH)	D (SIDE)	E (SHOULDER)
2	7/16	2 7/8	1 3/16	1 3/16
3	7/16	3 7/8	1 5/8	1 5/8
3 1/2	1/2	4 1/2	1 7/8	1 7/8
4	1/2	5	2 1/16	2 1/16
5	1/2	6	2 1/2	2 1/2

In addition to the above line of OCT-O-DUCT we can manufacture special ducts to order.

Send for new Soapstone OCT-O-DUCT Catalog and Installation Manual. No obligation.

SOAPSTONE DUCT COMPANY

110 Linfield Drive, Menlo Park, California



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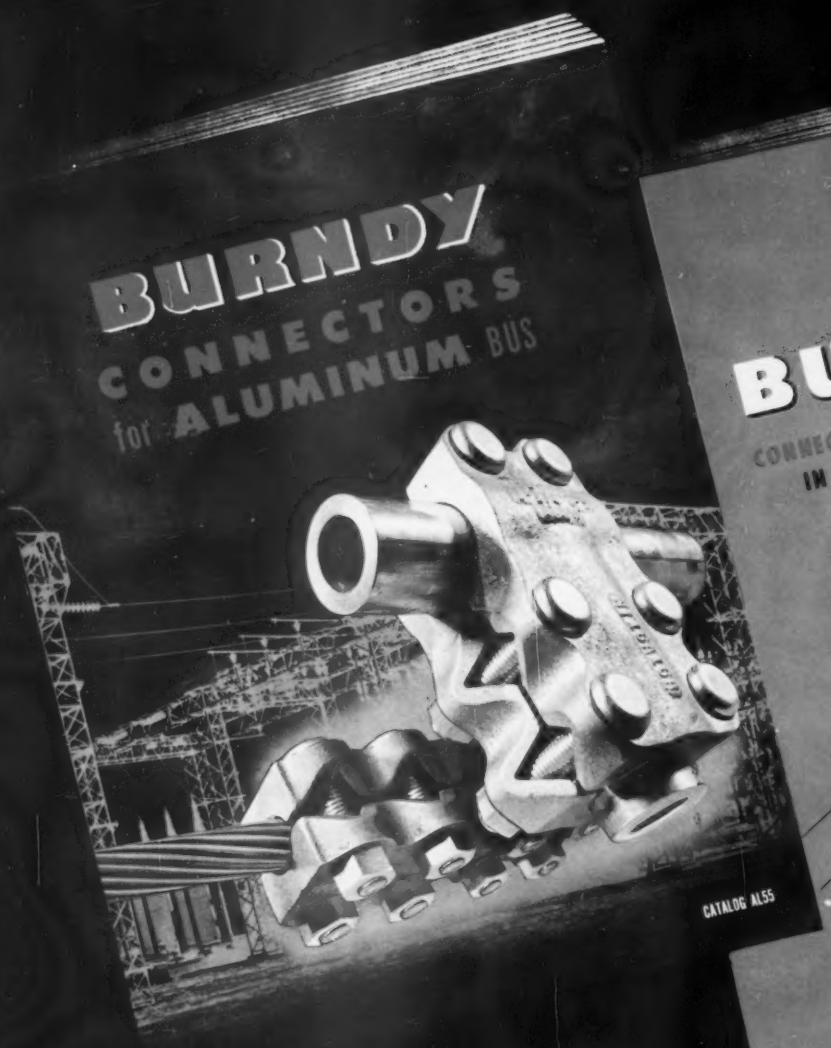
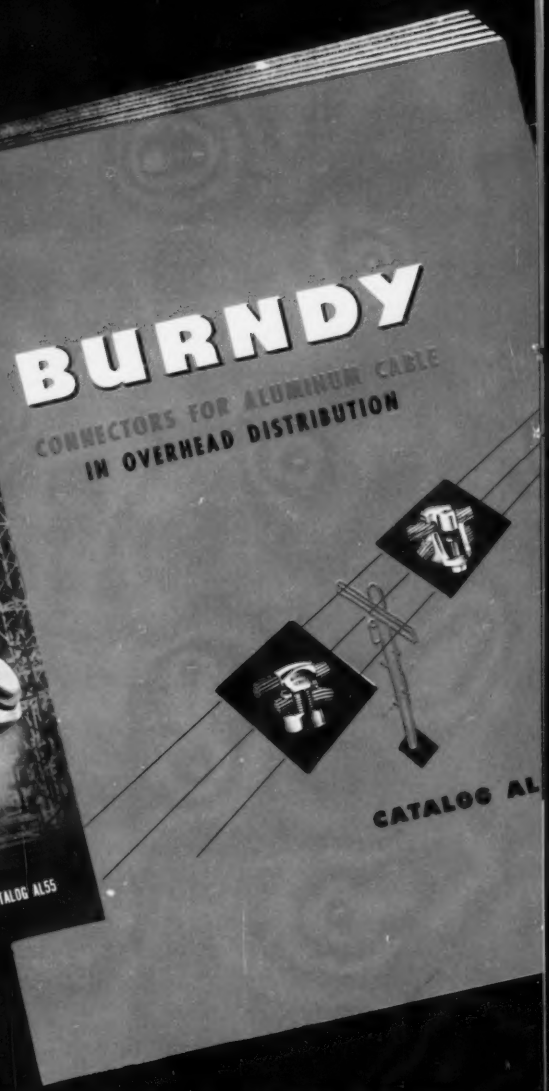
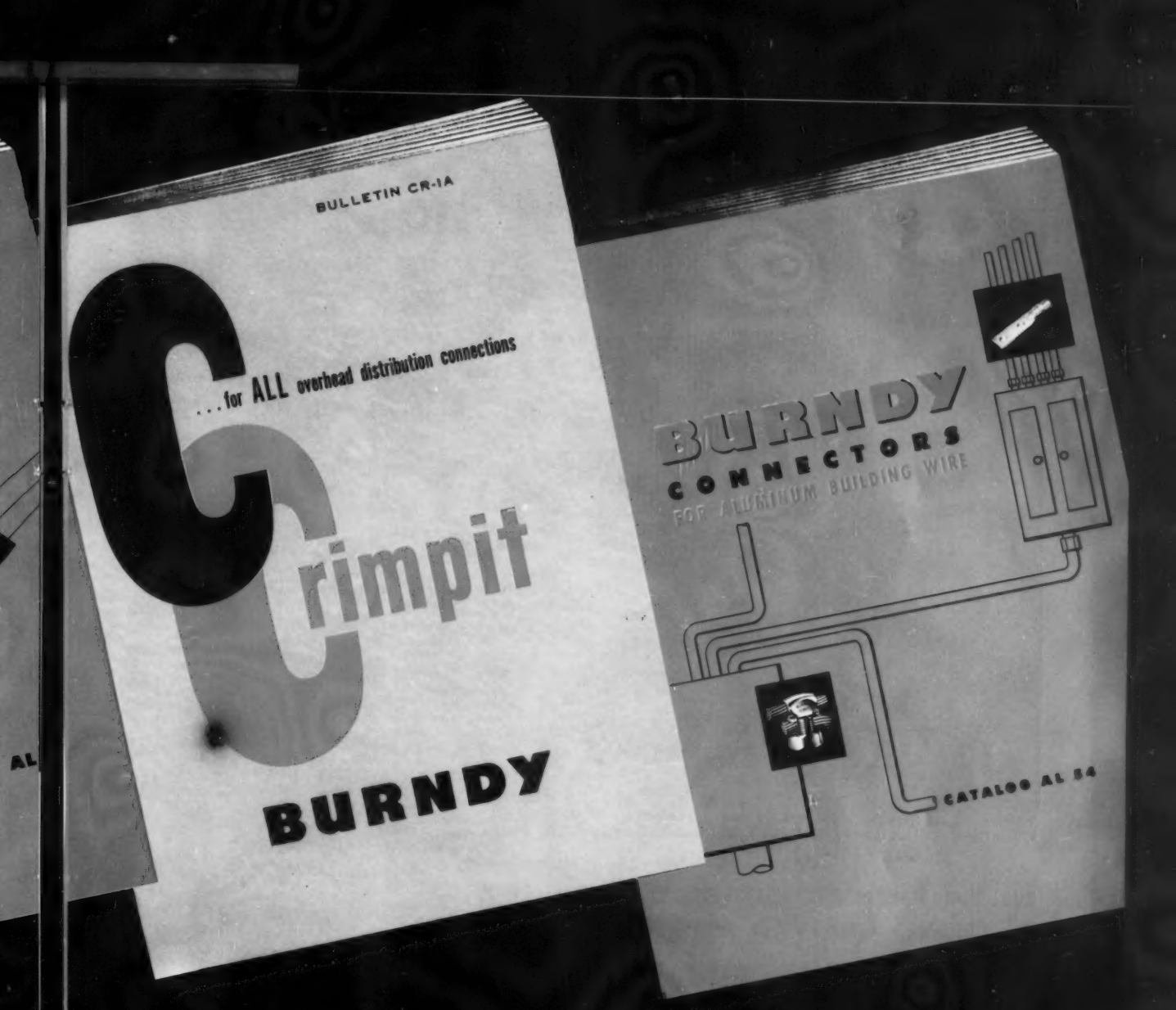




if you are considering

ALUM

Yours . . . FREE for the asking—a veritable "library" on electrical connectors for aluminum. This compilation of technical details and methods is made possible by Burndy's years of intensive design and manufacturing in this important field. Whatever your current or contemplated project—substation, transmission, or distribution—these catalogs can help you select the methods as well as the connectors best suited to the job.



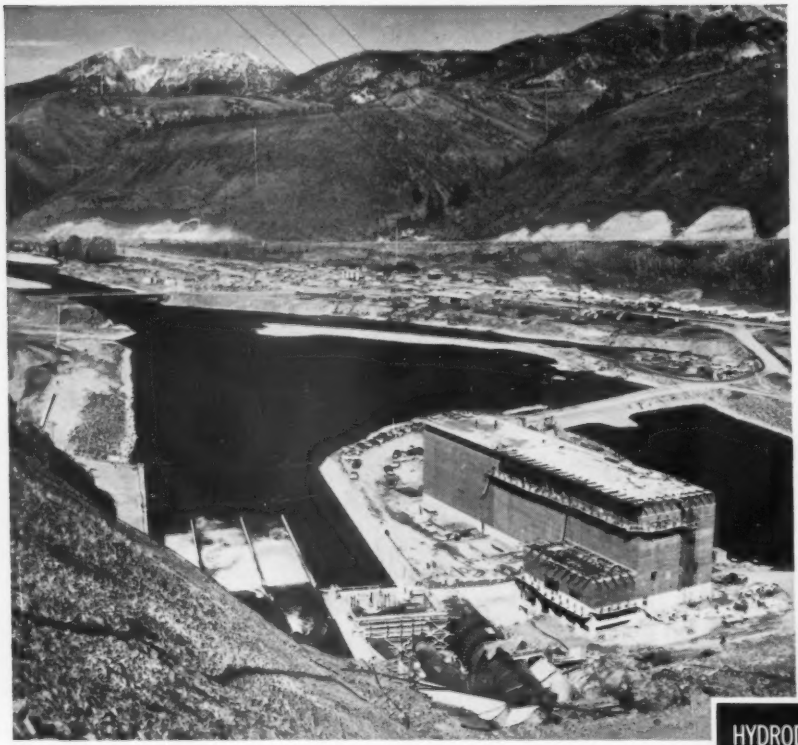
INUM

here are your connectors

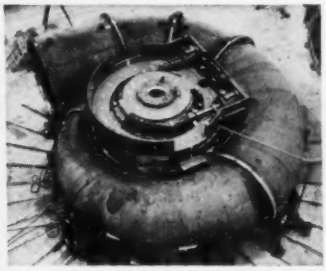
BURNDY

55-27

Norwalk, Conn. · Toronto, Canada · Other factories: New York, Calif., Toronto · Export: Philips Export Corp.

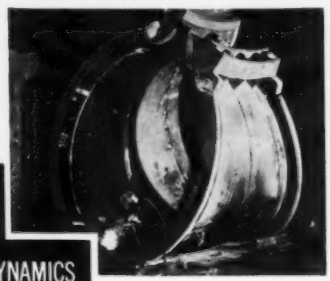


View downstream from the dam toward the powerhouse shows the irrigation bypass (left), penstock (center) and tail-race canal (right). *(U.S.B.R. photo)*



Final check assembly of Unit #2—a complete scroll case, pit liner, distributor gates and operating mechanism—is made in SMS shops prior to shipment to the site.

Welding a flange to a section of Unit #3's spiral steel case. SMS shops are completely equipped to fabricate weldments of the largest types.



HYDRODYNAMICS

MILE-HIGH SMS-FRANCIS TURBINES SOON TO DELIVER POWER AT PALISADES

High on the south fork of Idaho's Snake River, the first of four SMS-Francis turbines at Palisades Dam is scheduled to go on the line in 1956. The Palisades Dam, which is the Bureau of Reclamation's largest earth-filled dam, is primarily an irrigation project. The dam will have a crest length of 2,100 feet, rise 270 feet above the streambed, and provide a storage reservoir some 20 miles long and 3 miles wide.

Four vertical SMS-Francis turbines will be installed to produce a total capacity of 114,000 kw. Designed to operate at a site more than a mile above sea level, each unit is rated at 39,500 HP under a 190-foot head. The power generated will serve southeastern Idaho, where Atomic Energy Commission facilities and a growing phosphate industry now tax the existing electric supply.

Whatever your needs in hydraulic turbines and accessories may be, S. Morgan Smith offers 79 years' background in designing and manufacturing equipment for world-wide installation. This experience—over 16,000,000 HP installed capacity—is your greatest assurance of satisfactory equipment performance. For full information, write S. Morgan Smith Company, York, Penna., U.S.A.

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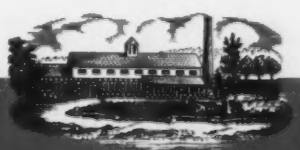
AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

Time

Time is the measure of all things. Few of man's inventions can stand its merciless judgment. Yet Kerite for 102 years has thrived and spread and gained renown. Time, indeed, gives Kerite its unqualified recommendation.

The Value And Service Life Of A Product Can Be No Greater Than The Integrity And Craftsmanship Of Its Maker.



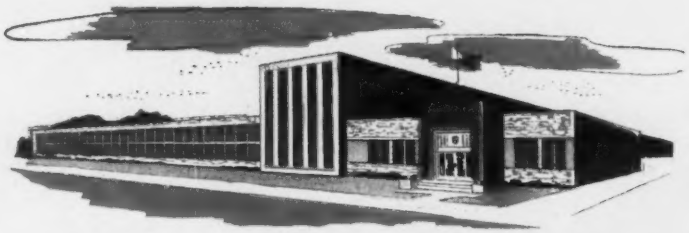
KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco; 3901 San Fernando Rd., Glendale 4, Calif.; 31 St. James Ave., Boston

"Our ALLIS-CHALMERS switchgear

Says:

HENRY KLINGBEIL,
Plant Engineer
GIDDINGS & LEWIS



And he should know! He helped with the planning and he was on hand during the installation.

The problem: to tear out the old switchgear, install three new switchgear lineups plus one control lineup — and have the plant ready to go when the two-week vacation shutdown was over.

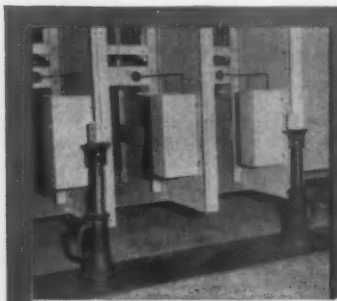
Months of careful planning and scheduling went into the job. In addition, these features of Allis-Chalmers Switchgear helped Giddings & Lewis, and their contractor, meet this tight schedule:

- Special arrangements for jacking structure.
- Jig-built stationary and removable elements that assure interchangeability.
- Swing-out type potheads to simplify cable connections.
- Dry-type bus joints eliminate compounds.
- Open-ended bus compartment that makes it possible to slide cubicles into place without lifting them over the floor cable.

Perhaps you have an electrical modernization problem and must think in terms of fast changeover.

If so, Allis-Chalmers has two things to offer: (1) Switchgear features that make installation fast and easy; and (2) close cooperation at every stage of the job.

Call your nearby Allis-Chalmers office early in the planning stage. Or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

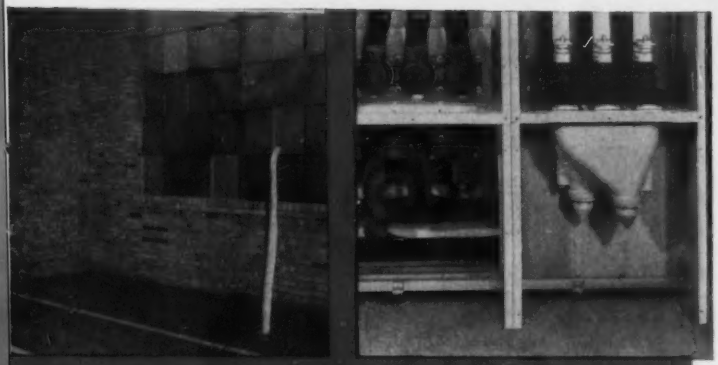


Cubicles were placed on rollers and moved into place at Giddings & Lewis. Here is simple jacking arrangement that makes lifting cubicles easy.

This dry-type bus joint, originated by A-C, speeds the job, allows expansion or contraction of bus. There's no fuss, no muss, no messy compounds.

ALLIS-

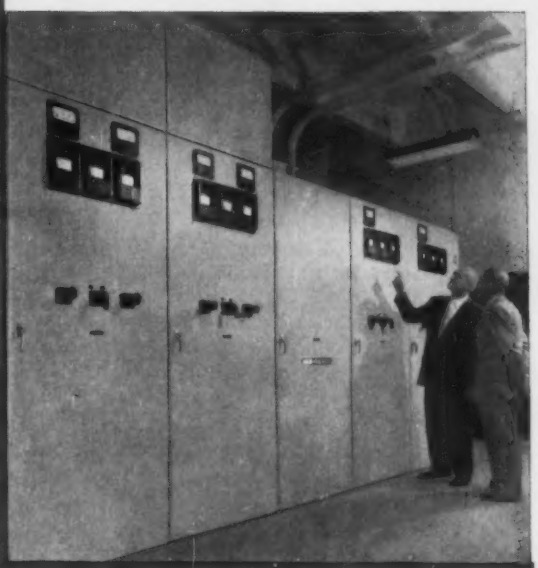
went in fast, without a hitch..."



Giddings & Lewis had floor cable in place before switchgear arrived, as in photo at left.

Placing Allis-Chalmers switchgear over floor cable, as in photo at left, is a simple operation. It can be done without lifting cubicles. Rear of cubicle has no cross member at floor line, switchgear can be slid into place.

Below, completed installation is being checked by Allis-Chalmers representative, John Gerber, and Henry Klingbeil of Giddings & Lewis.



Modern factory-built unit replaced piecemeal arrangement. Since the whole installation is factory engineered and assembled, this in itself speeds installation.

A-4891

CHALMERS A-C ALLIS-CHALMERS

Get booklets on the All-New Allis-Chalmers Low Voltage Switchgear. Ask for Bulletins 1888252 and 1888283.

AFTER 250 MILLION DISK REVOLUTIONS, or an equivalent of more than 300 years of meter operation, life tests show no bearing wear in General Electric's magnetic suspension system.

Life Tests Prove...

LABORATORY RUNNING TESTS on sample lots of General Electric's I-50 meter family serve as additional checks on over-all meter performance and the lifetime characteristics of the magnetic suspension system.

No Bearing Wear

A true lifetime bearing system, already having registered the equivalent of more than 300 years' use under normal operating conditions, is now assured with all members of General Electric's I-50 meter family. Results from continuing accelerated life tests, conducted in General Electric research laboratories, prove that the revolutionary magnetic suspension system eliminates the need for bearing replacement.

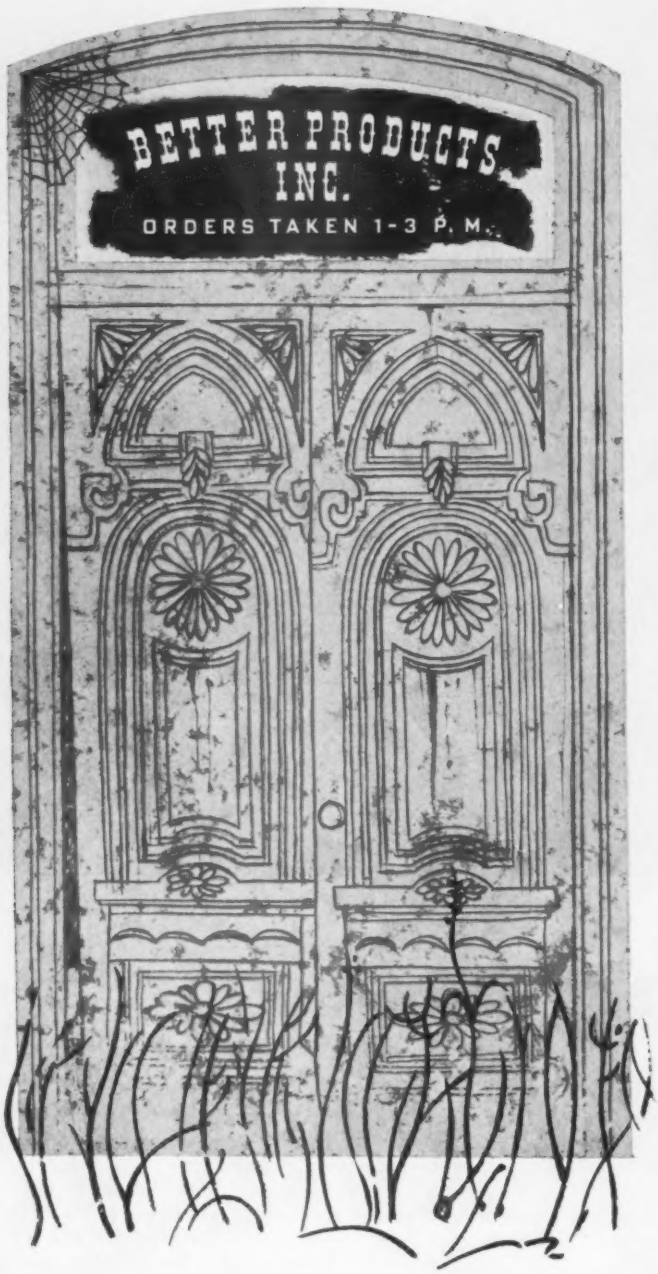
These General Electric meters have registered more than 250 million revolutions of the floating disk. This is equal to over 300 years of meter operation at the national average load of 3000 KWH annually. Results show no measurable wear on the graphite washer or guide pin in G.E.'s magnetic suspension system.

These tests substantiate the perfect record of the magnetic suspension system in the more than 6,000,000 I-50 meters in service today. They offer proof that G.E.'s meter family—by eliminating bearing maintenance and replacement expenses—assures you of lower metering costs. For more information contact your nearest G-E Apparatus Sales Office or write General Electric Company, Section 621-4, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.



what happened to the world?

What went wrong? Had a fine new product. Just what the world needed. Now sit back and watch the world beat a path to the door.

But it never did. Truth is, the world never heard of the outfit. Or its fine new product. Couldn't have cared less.

Advertising would have made the difference in this case. (Although it doesn't help a product that isn't basically sound.) Advertising spreads the word to the trade and public. Lets them know who you are. What you're offering. What it will do. What it costs.

Advertising whets interest and opens doors for salesmen. It creates demand.

And it does more. For when it helps you sell, it helps you provide jobs. And when it creates mass markets, it helps you bring down prices. It raises everybody's standard of living, which in turn, creates more buying power. It's a victorious circle.

As a businessman, you already know advertising helps you sell. But you're a consumer, too. And—

Advertising Recognition Week February 19-25

ADVERTISING HELPS YOU LIVE BETTER FOR LESS!

The NEW "REDEGE" Benfield Bender

3 tools do all hand bending jobs of both rigid Conduit and EMT

Here is a new one-piece hand tool for bending Sherarduct, other types of rigid steel conduit, and Xduct Junior electrical metallic tubing.

It's the first universal portable hand bender ever to be developed which can be used for both rigid conduit and thin wall tubing. A low cost tool, competitively priced, it eliminates the need for bench-mounted bending equipment for small size conduits.

CHECK THESE FEATURES:

One piece—with solid non-skid hook

Extended foot treadle—gives extra bending leverage

Safety reinforcing collar—removes strain from threads

Built-in back pusher

Bender is also measuring gauge—rules, tape measures often unnecessary

Five year guarantee against breakage or defects

Peek hole for left-handed use

3 TOOL SIZES

Catalog #1050—Bends ½" thin wall

Catalog #1075—Bends ¾" thin wall and ½" rigid conduit

Catalog #1100—Bends 1" thin wall and ¾" rigid conduit

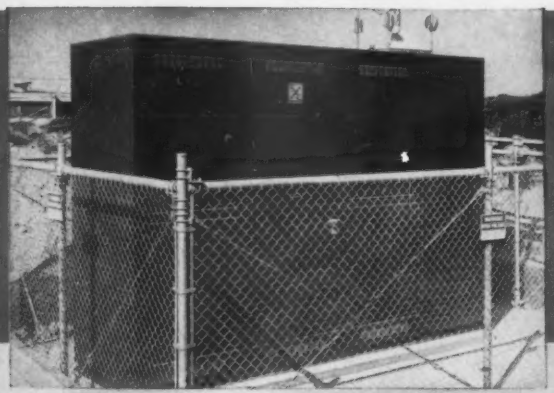
Make the Test . . . Combine the Best—Sherarduct Conduit and the Redege Bender

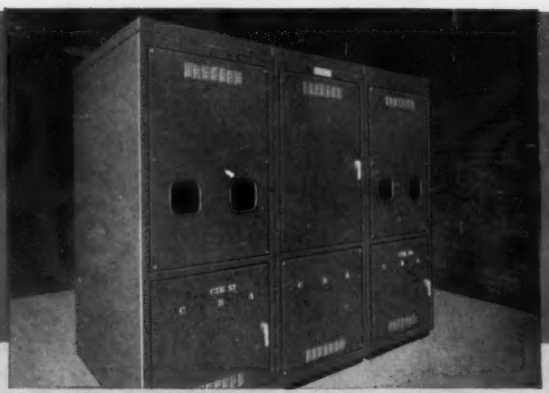
National Electric Products

TORRANCE, CALIFORNIA

Branch Offices: San Francisco • Seattle • Denver
Los Angeles • Salt Lake City • Portland • Phoenix

Now... metalclad primary gear for ...in one Low Cost





SIMPLIFY PREFERRED-TO-EMERGENCY SWITCHING WITH

S&C's new "Package" approach

Here is a simplified solution to the demands for uninterrupted service . . . a complete throw-over "package" that overcomes the disadvantages of previous methods that were unsightly, costly, and complicated. S&C's new package is compact, economical, and completely enclosed—ideal for distribution and industrial substation applications.

LOW COST—Standardized design and factory assembly techniques provide substantial savings. The entire system is factory tested and ready to set into place . . . no costly on-the-site construction, assembly, or check-outs to make.

SAFE—The tamper-proof metalclad unit prevents access to unauthorized persons. Thus it is suitable for residential and industrial areas.

ATTRACTIVE APPEARANCE— All sensing, switching, and protective devices are enclosed in a metalclad unit. There are no ugly motor-driven, pole-mounted switches. Simple lines, neutral finish, and compact, streamlined construction are in keeping with the planning of today's residential and commercial neighborhoods.

15-CYCLE AUTOMATIC THROW-OVER—Throw-over in case of an outage is accomplished in about 15 cycles or less, rather than the several seconds required with motor mechanisms.

FULL LOAD INTERRUPTION—S&C Load Interrupter components permit the entire load to be dropped at any time under any conditions except short circuit.

throw-over schemes

Package

A TYPICAL S&C THROW-OVER PACKAGE

Super-Durable Finish is beautiful and long lasting . . . prevents rust and minimizes maintenance.

S&C Power Fuses protect transformer primary whether supplied by preferred or emergency source.

S&C Load Interrupter on preferred source opens on power failure.

S&C Load Interrupter on emergency source closes on power failure.

S&C Gear is a complete package ready for service. Just make up the potheads . . . no on-the-site engineering, assembly or testing required.

Potential Transformers sense both preferred and emergency sources . . . transfer occurs only if there is voltage on the alternate source. (Secondary sensing is optional.)

Control Panel and Operators (at rear of center section) provide for load transfer to an emergency source of power when there is a loss of voltage on the preferred source. With economical semi-automatic spring operators, the load is returned manually at the convenience of the operator. With optional hydraulic operators, back transfer occurs either when preferred voltage is restored or when a loss of voltage occurs on the alternate source.

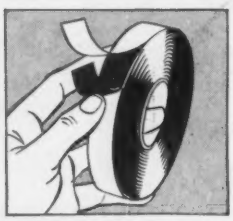
Specialists in High-Voltage Switchgear for Electric Utilities since 1910

S&C ELECTRIC COMPANY

4425 RAVENSWOOD AVENUE • CHICAGO 40, ILLINOIS, U.S.A.

Consult your telephone directory. Sales offices in Birmingham, Boston, Buffalo, Chicago, St. Louis, Cleveland, Dallas, Dearborn, Denver, Houston, Huntington, Indianapolis, Jersey City, Kansas City, Little Rock, Memphis, Minneapolis, New Orleans, Philadelphia, Pittsburgh, Portland (Ore.), St. Petersburg, Salt Lake City, San Francisco, San Gabriel (Los Angeles), Seattle, Syracuse, Washington, D. C. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.

New! Self-bonding butyl tape for high-voltage application!



"SCOTCH" 23 *Tape is heavy-gauge (35 mil) black butyl rubber with special liner for easy unwind.*

At last! A true high-voltage splicing tape! It's "SCOTCH" 23—newest addition to the famous "SCOTCH" Brand electrical tape family.

"SCOTCH" 23 Tape is compounded of a butyl rubber base and other selected materials to provide maximum protection for your high-voltage splices. It is designed for primary insulation applications, and wherever a "filler" tape is required; combines superior insulation resistance with high dielectric strength, excellent corona resistance, low dissipation factor and dielectric constant. It is non-corrosive to copper and silver; resists cold flow and cut-through, and is unaffected by ozone.

Self-bonding! "SCOTCH" 23 bonds itself into a solid, homogenous mass. Your splice is ready immediately for a final protective barrier-wrapping of "SCOTCH" Brand Plastic Tape. For further information, write 3M Co., Dept. BU-26.

Order a trial supply! It's individually boxed in ¾-in. x 30 ft. rolls. And when you're ordering, check your stock of plastic tapes in three thicknesses: "SCOTCH" 33 (standard weight), "SCOTCH" 22 (heavy), and "SCOTCH" 21 (extra-heavy). Be ready, be *right* with "SCOTCH" Brand!

REG. U.S. PAT. OFF.
SCOTCH BRAND **23**
Electrical Tape

PRODUCT OF 3M RESEARCH

The term "SCOTCH" is a registered trademark of Minnesota Mining and Manufacturing Company, St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

3M COMPANY

Specify ANDERSON

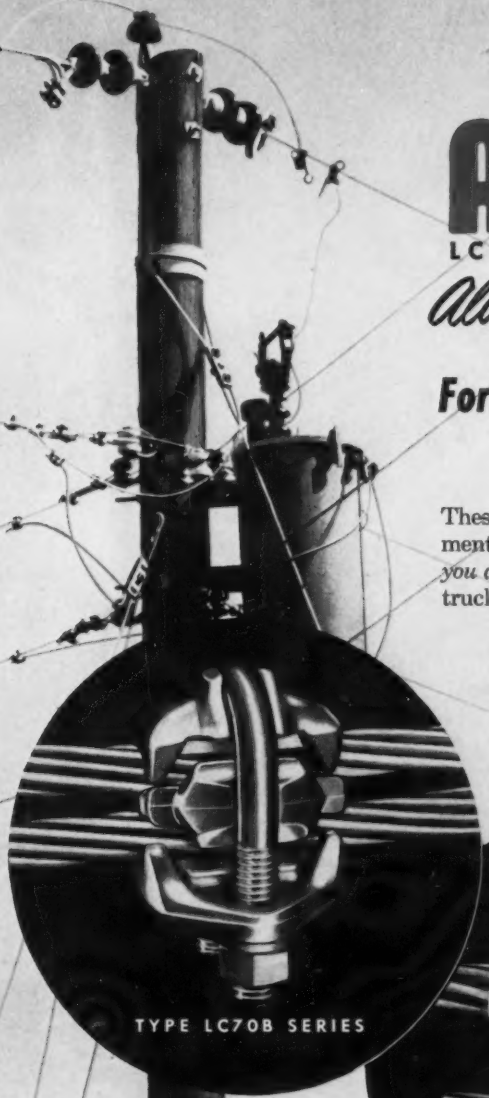
LC50 - LC500 - LC70B SERIES

Aluminum CONNECTORS

For WIDER APPLICATION on Aluminum Distribution Systems

These Anderson Connectors will eliminate the large assortment of types and sizes you are now using—*and still give you a wider range of application.* They save costs . . . reduce truck inventory . . . save time on the job.

CATALOG NO.	MAIN	TAP
LC-51A	No. 6—1/0 ACSR	No. 6—No. 2 ACSR
LC-52A	No. 6—1/0 ACSR	No. 6—1/0 ACSR
LC-511A	No. 6—1/0 ACSR	No. 8—No. 2 COPPER CABLE
LC-522A	No. 6—1/0 ACSR	No. 8—1/0 COPPER CABLE
LC-70B	No. 6—No. 2 ACSR	No. 6—No. 2 ACSR
LC-71B	No. 6—1/0 ACSR	No. 6—1/0 ACSR



TYPE LC70B SERIES

TYPE LC50-LC500 SERIES

ABW DESIGN MEANS QUALITY Plus STRENGTH in the RIGHT PLACES!

Consult one of our nearest 20 representatives or contact our main office.

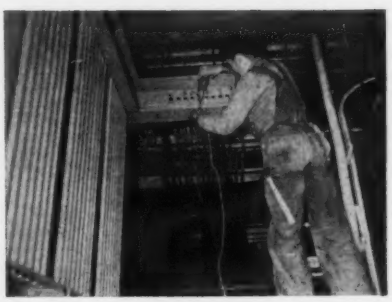
Aluminum & Bronze POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES for SUBSTATION • TRANSMISSION • DISTRIBUTION SYSTEMS *for over a Quarter Century*

ANDERSON BRASS WORKS, INC.

P. O. DRAWER 2151 • BIRMINGHAM 1, ALABAMA

1. The clean, corrosion-resistant exterior finish of Rome • EMT provides neat, long-lived installations for commercial buildings.

2. Compression-type fittings simplify installation, save time. Light weight of Rome • EMT makes overhead work easier.

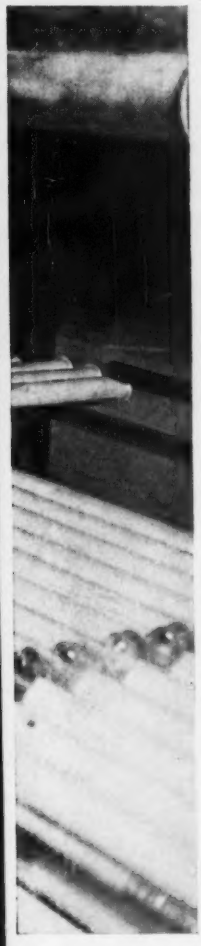


3. Easy workability plus compression-type connectors make Rome • EMT easy to route through junction and pull boxes.

Rome • EMT is available for immediate shipment in sizes ½" through 2" from these 13 convenient warehouse points:

Atlanta, Ga.	Denver, Colo.	Los Angeles, Calif.	Salt Lake City, Utah
Chicago, Ill.	Houston, Texas	Rome, N. Y.	San Francisco, Calif.
Dallas, Texas	Kansas City, Mo.	St. Paul, Minn.	Seattle, Wash.

Torrance, Calif.



The bigger the installation, **the more you save** *with Rome • EMT*

This slick, shiny new interior in Rome • EMT lets fish tapes slide through with an absolute minimum of resistance.

The easier electrical metallic tubing is to work and to fish, the more time you save, and the more money you make.

If you haven't taken advantage of Rome • EMT in your work, you are missing a sure bet in this respect.

OUTSIDE—*clean, easy to work*

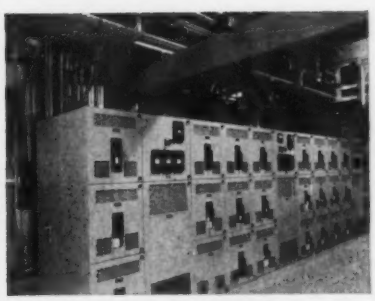
Rome • EMT saves man-hours of installation time. It's light in weight, easy to bend. It's designed for one-man handling, with threadless compression joints. Its clean, corrosion-resistant, nonflaking exterior finish gives you installations you'll be proud of for years to come.

INSIDE—*slick, easy to fish*

Comparative tests show conclusively that fishing is easier and faster through Rome • EMT than through any competitive conduit on the market. Its new inside finish cuts fishing time and effort to the minimum.

Get the mechanical, chemical and electrical protection of a top-quality EMT. And, to reduce your costs, get maximum ease of installation. For residential, commercial and plant wiring safety and adequacy, specify Rome • EMT and save.

For more details, contact your nearest Rome Cable office or warehouse.



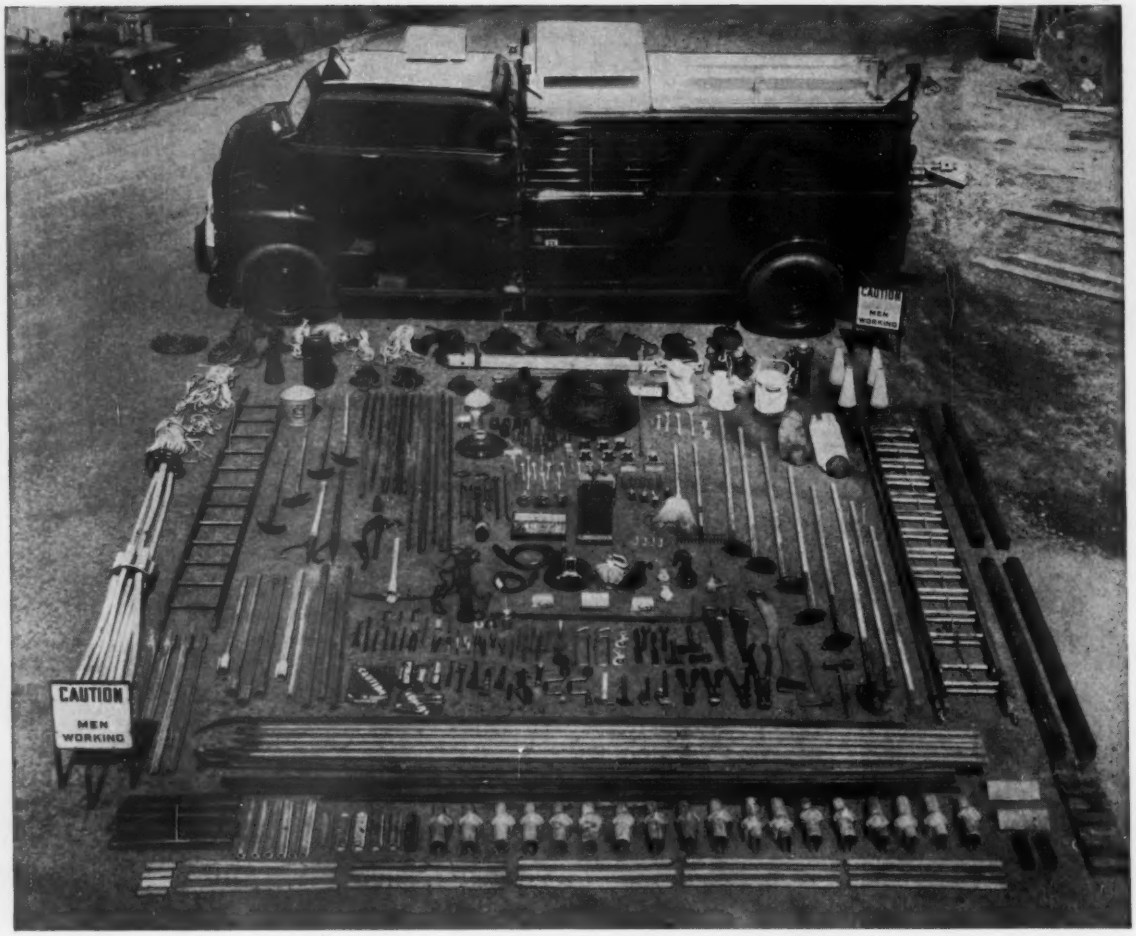
4. Easily bent and shaped to building angles, Rome • EMT makes neat banks for high-voltage industrial installations such as this.

Informative, free booklet on conduit

The Rigid Steel Conduit and Electrical Metallic Tubing Section of N.E.M.A. has prepared an informative and helpful book on conduit. We'd be glad to send you a copy.

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA



Look at your line truck equipment needs from this angle . . .

Here's a poles-eye view of a typical utility line truck showing the wide variety of construction and maintenance tools and safety equipment your linesmen need for most day-to-day jobs. But—without exception—each and every item shown can be ordered conveniently from your nearby Graybar office or warehouse . . . and in every case you get the type and quality needed to assure speed and efficiency on the job *plus* long years of satisfactory service. All are products your linesmen know and respect—products that have been tried, tested and proven in the field by scores of companies just like your own.

Remember, when you order "via Graybar", you save the time and expense of multiple inquiries, for you can select, from this single source, the items best suited to your needs from among the products of over 200 of the nation's leading manufacturers.

Graybar is thoroughly familiar with utility requirements. Further, your nearby Graybar Representative stands ready to help as a convenient source of information on everything needed for pole-line construction and maintenance. And should you be faced with an out-of-the-ordinary problem, call on the experience of a Graybar Outside Construction Specialist for a consultation. We'll welcome your inquiry!

511-82

CALL GRAYBAR FIRST FOR . . .

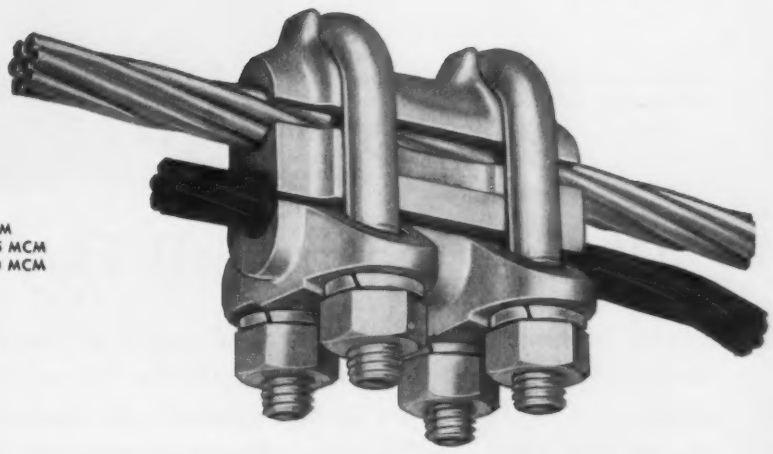
Everything Electrical

GraybaR ELECTRIC CO., INC.
420 Lexington Ave., New York 17, N. Y.

IN OVER 120 PRINCIPAL CITIES

CORROSIVE SOLDERING ELIMINATED!

in BLACKBURN'S Heavy Duty Bi-Metallic Connectors

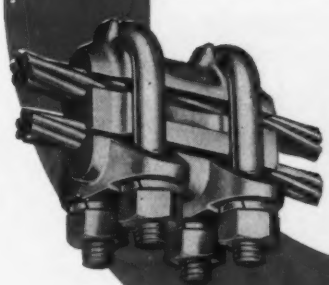


Sizes available to accommodate ACSR 2—[illegible].4 MCM Alum. 1 Str.—397.5 MCM Copper 4 Str.—250 MCM

PRESSURE SEALED, SHRINK-FIT COPPER LINER SEALS OUT AIR AND MOISTURE—PERMANENTLY!

- Manufactured under controlled atmospheric conditions!
- Eliminating corrosive solders and fluxes between copper liner and aluminum casting insures permanent high conductivity.
- Factory applied protective coating prevents oxidation of contact spacer grooves during transit and storage.
- Castings are high-strength, heat-treated alloy with exceptionally heavy cross sections.
- Clamping forces are distributed over extra long surfaces—contour of grooves protects conductor.
- All Aluminum hardware is alumilited to prevent seizing—bolt features rolled threads of greater strength.

Sizes available to accommodate ACSR 2—[illegible].4 MCM Alum. 1 Str.—397.5 MCM



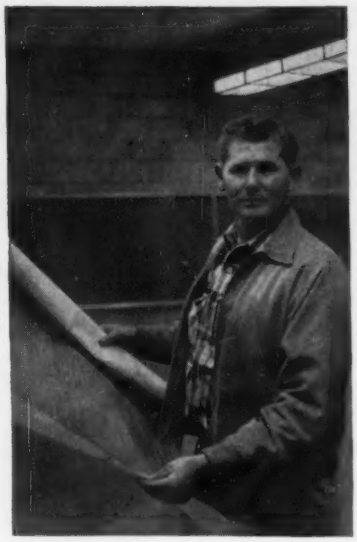
HEAVY DUTY ALL ALUMINUM CONNECTORS

Also available without copper liner for Aluminum to Aluminum. Coefficient of expansion same as conductor. Same high standard of material and construction as above connector.

BLACKBURN *Hi-Strength* **CONNECTORS**

JASPER BLACKBURN CORPORATION · 35 MADISON ST. · ST. LOUIS 6, MO.
PHONE MAIN 1-2831

Lighting by DAY-BRITE makes the big difference...



Donald Dingman of Dingman's Electric Service, Redwood City, California

"We like to install Day-Brite"

"From the contractor's standpoint, a big feature of Day-Brite fixtures is their ease of installation and lining up. In one of our recent jobs—the Henry Ford School—we particularly appreciated the ease with which Day-Brite's A-J adjustable hangers permitted us to clear several clocks mounted on angular slopes between ceilings and walls.

"Another thing we like is their easy accessibility for lamping and cleaning—this is especially appreciated by the users."

These comments by Donald Dingman are typical of hundreds made by contractors throughout the United States. Why don't you try Day-Brite—and see.

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc.
5412 Bulwer Ave.
St. Louis 7, Missouri

Exterior view of Henry Ford Elementary School, Redwood City, California—one of Dingman's recent installations.

61113 Nation's largest manufacturer of commercial and industrial lighting equipment

UP Distribution Regulator Ratings to 167 Kva

DOWN Cost of Regulation

Here's the best regulator news since Allis-Chalmers originated 5/8% step regulation over 22 years ago:

► Now—you can get the same high-quality regulation . . . the same time-proved mechanism you've always had in Allis-Chalmers station-type equipment . . . and . . .

► *At lower cost . . . you can now use single-phase distribution regulators* . . . instead of using station regulators or load tap-changing transformers.

This has been done by taking advantage of over twenty-two years of regulator development. The result — a regulator that combines the advantages of mass production and simplification of parts with the elimination of features that do not directly contribute to regulation.

You get the same 1% control accuracy and 20% range of regulation as in station regulators. Eight years of field operation have proved Allis-Chalmers distribution regulators will stand up under toughest operating conditions.

ALLIS-CHALMERS
Originators of 5/8% Step Voltage Regulation

Ratings Available

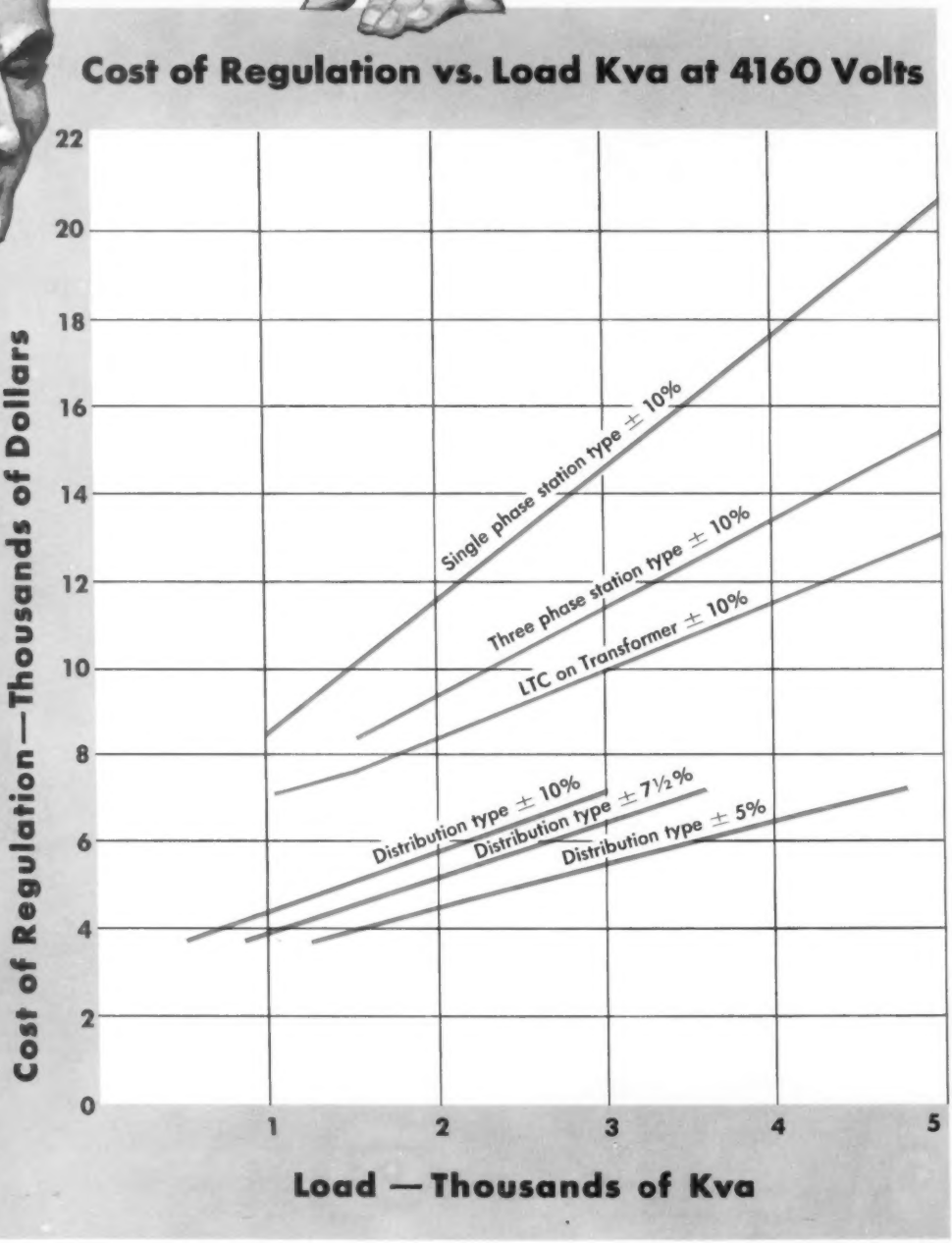
14,400 volts — 50, 100 amp
7,620 volts — 15, 25, 50, 75, 100, 150 and 219 amp
5,000 volts — 50, 100, 150 and 200 amp
2,500 volts — 100, 150, 200, 300 and 400 amp

Chart on Next Page Shows BIG SAVINGS

ALLIS-CHALMERS

A-4946

Save Up



ALLIS-

to 50%

ALLIS-CHALMERS
Originators of
5/8% Step
Voltage Regulation

with

New Single-Phase Distribution Regulators

With the low cost of distribution regulators, it may pay you to re-evaluate the methods of voltage regulation on your system. In many cases you'll find it is now possible to bring the advantages of single-phase distribution regulation to every feeder in the system. Everyone benefits. You'll get 1% control accuracy, 20% range of voltage regulation—increased revenue and profits.

In addition to the savings in first cost, you have greater installation flexibility.

Check the Comparison in the chart below:

Type of regulation	3000-Kva Load 4160 Volts, 400 Amp	5000-Kva Load 13,800 Volts, 219 Amp
Three 1-phase station regulators	**$14,610**	**$21,900**
One 3-phase station regulator	**11,520**	**15,705**
Load tap-changing portion of transformer	**9,916**	**13,206**
Three 1-phase distribution regulators	**7,050**	**10,611**

Why Pay a Premium of 24% to 100%?

CHALMERS

A-C ALLIS-CHALMERS

Vari-Amp Feature

permits tailoring regulator to system needs

One Regulator Provides

5 Current Ratings

25 Regulating Combinations

Here's what this means: There's no need to use ± 1% regulation if your system can operate more profitably at reduced regulation and increased load.

Or, look at it another way; as loads grow, there's no need to change regulators when Allis-Chalmers regulators are on your system. The *Vari-Amp* feature lets you step up ratings as much as 60% by slightly reducing the range of regulation.

Here's how it works: By reducing the range of regulation you can increase the current-carrying capacity. The *Vari-Amp* feature provides stops that limit the range of regulation in 5 current ratings and 25 regulating combinations.

Also Use Unequal Ranges

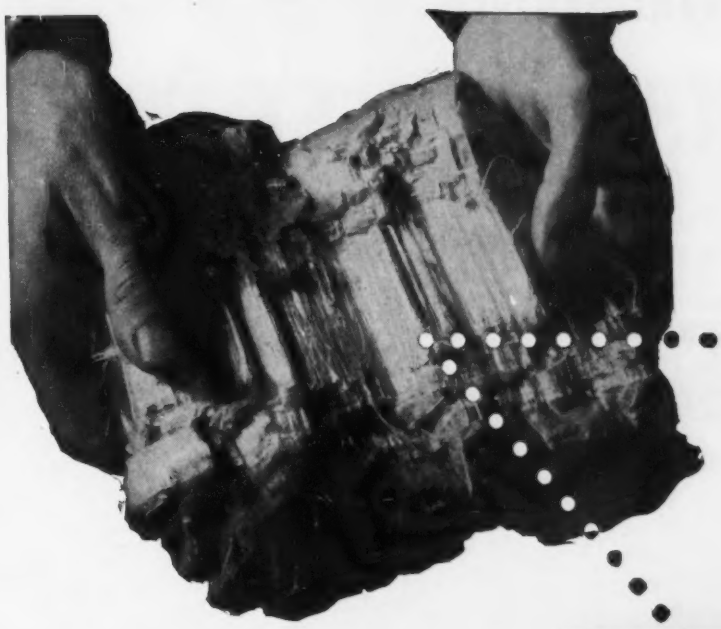
You can also get considerable flexibility using unequal ranges of regulation. For example, set the *Vari-Amp* feature to provide 6¼% raise at 135% current, 10% lower at 100% current.

No Extra Cost

The *Vari-Amp* feature is available on all Allis-Chalmers regulators.

Get the full story on this and all the other features of Allis-Chalmers regulators. Call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS



From the magic mineral ...ASBESTOS

come these strong, durable

TRANSITE DUCTS

made to stand the test of time..

Transite* meets every requirement of the ideal duct material. It is permanent, fireproof, corrosion resistant, strong, light in weight, smooth-bored, non-inductive, and has rapid heat dissipation. No protective coating is required. The 10-foot lengths are rapidly assembled. Transite will outlast other duct materials. Write for new, free brochure showing how J-M Transite Ducts can effect substantial savings in both installation and maintenance of cable subways. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.

Available In Two Types:

TRANSITE CONDUIT

Thick walled, used for exposed work, or buried without concrete casement saves time, labor, materials.

TRANSITE KORDUCT

Thinner walled for installation in concrete. Used for high-voltage lines, its high thermal conductivity cuts operating losses.

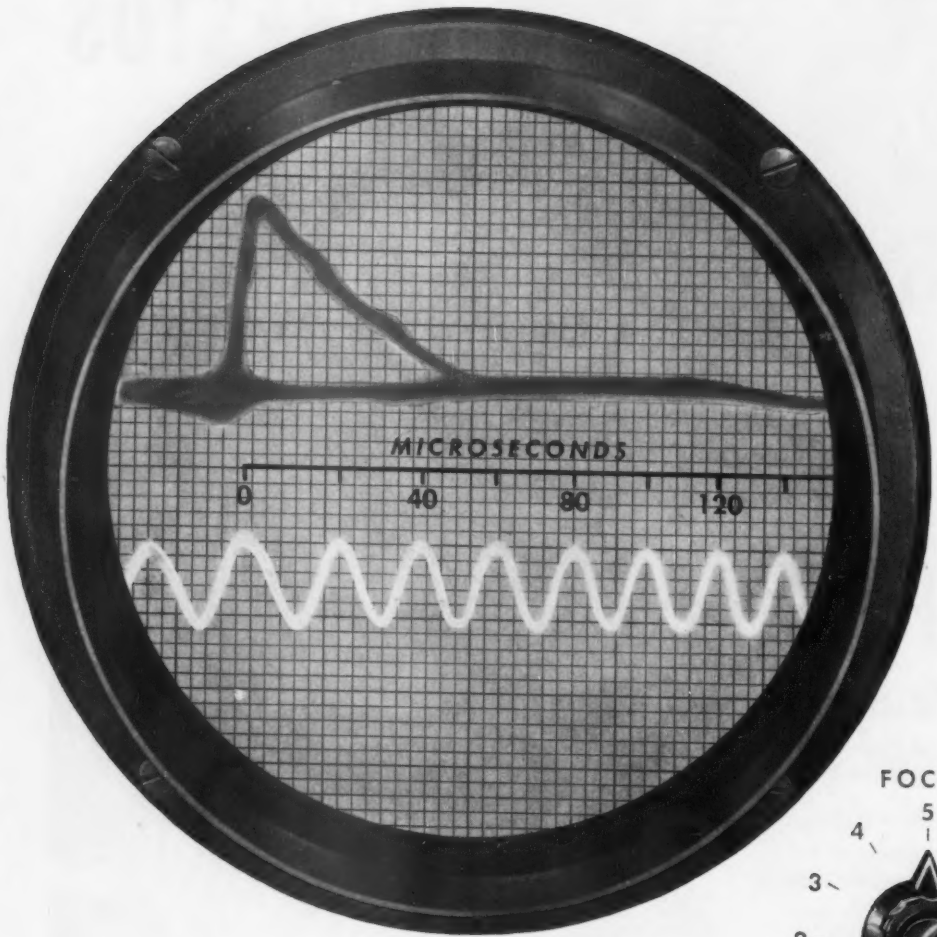
JOHNS-MANVILLE JM PRODUCTS

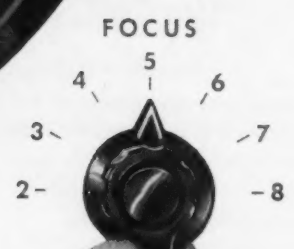
Johns-Manville

*Trade mark registered

DISTRIBUTION TRANSFORMERS

THIS IMPULSE TEST





FILAMENT

SCREEN LIGHT

EXCITATION

COULD SAVE YOU...$45

Estimate your possible savings in terms of all transformers on your lines

When General Electric started production-line impulse testing its distribution transformers in 1946 more than 15% of the units were rejected. These units had previously passed **all other tests.** Had these transformers been shipped, they might have given years of satisfactory service under normal conditions, or they might have failed under sudden stress.

By weeding out failures in advance it is conservatively estimated that the average life of distribution transformers is increased 15%. Based on the cost of a 25-kva, 2400-volt unit this means a $45 saving on each transformer.

Impulse testing makes the difference. Every unit 100 kva and below has both high- and low-voltage windings tested on the G-E production line without lightning protection of any kind. Any hidden weakness is detected automatically and the faulty transformer is rejected. This means that every G-E distribution transformer you add to your system has already been proven under greater stresses than encountered in normal service.

Look at the other money-saving features that prove "All transformers are not alike": **One-piece clamping bands,** for instance, save maintenance time. Reusable **Nitrile rubber gaskets** help save units from contamination. **AL/CU terminals** are designed to prevent both copper and aluminum conductors from loosening. **Strenicor terminal clamps** save terminals from breaking. **Super Melaglyp paint** saves up to two repaintings. **Nationwide warehouses** save utilities heavy inventory expense. **Service shops** can cut your repair and rebuilding costs.

For the complete story contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to General Electric Company, Schenectady 5, New York.

431-36

dollar-saving features prove ATANA*

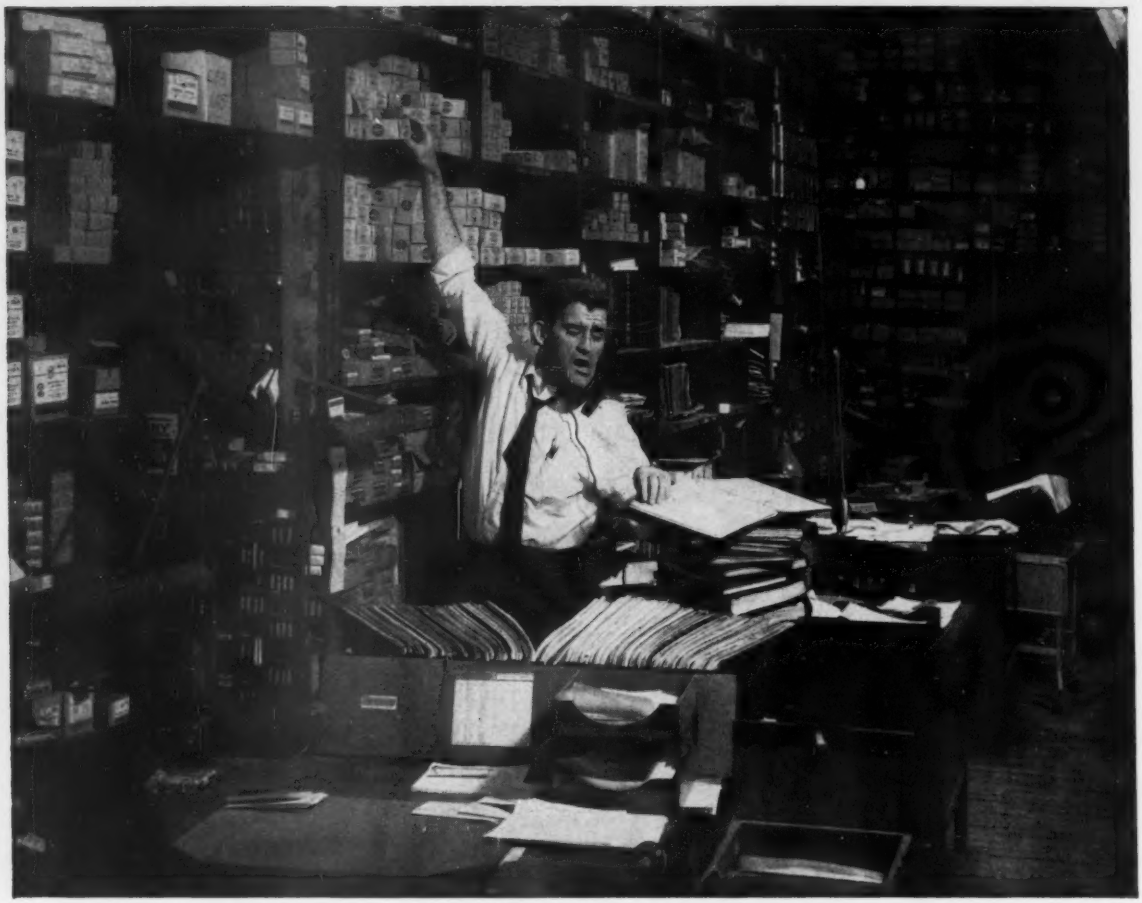
*ALL TRANSFORMERS ARE NOT ALIKE
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	√			√		√
Nitrile rubber gaskets	√					√
One-piece clamping band	√					
H-v and l-v terminals handle both copper and aluminum conductors	√					
Strenicor pressure terminal clamps	√					
Super Melaglyp paint	√					
More than 100 warehouses	√	√				
Nationwide, company-operated service shops	√	√				

Progress Is Our Most Important Product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.



This could be you—"In the Land of No Distributors."

Pictured is only a small fraction of the inventory, the catalogs, the confusion that would be *all yours* if it wasn't for the distributor! "In the Land of No Distributors"—*you* would have to carry a tremendous inventory —*and* insure it. *You* would have to collect hundreds of different catalogs, thousands of price sheets from manufacturers all over the country. What a mess!

In addition, "In the Land of No Distributors"—

- **You would go "telephone crazy" placing hundreds of calls a day to a variety of different manufacturers located miles away.**
- **You would be pestered by an army of manufacturers' salesmen.**
- **You would take the chance of getting only partial delivery—and waiting days for important equipment from "slow" manufacturers.**
- **Your "over-the-counter" purchases would be major endeavors.**
- **Your "Accounts Payable" and "Order Department" would be many times larger and more expensive than they are now because, instead of one order and one check to your distributor, you would have to make out many to your many manufacturing sources.**

That's why dependable electrical manufacturers advise you to always buy from

YOUR DISTRIBUTOR—THE BEST FRIEND YOUR BUSINESS CAN HAVE! He's the *one* source for *everything* electrical—and he's local.

It Must Be Right
The Trade Mark of TOP Quality
TRIANGLE

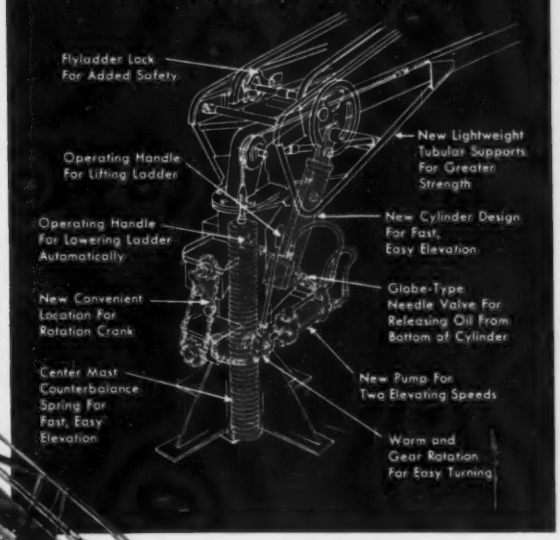
TRIANGLE CONDUIT & CABLE CO., INC.

NEW BRUNSWICK, NEW JERSEY

Manufacturers of Arteries for Electricity, Liquids and Gases

WIRE • CABLE • CONDUIT • BRASS and COPPER TUBE • PLASTIC PIPE

NEW 2500 SERIES MANUALLY-OPERATED HYDRAULIC LADDER


Flyladder Lock For Added Safety
Operating Handle For Lifting Ladder
Operating Handle For Lowering Ladder Automatically
New Convenient Location For Rotation Crank
Center Mast Counterbalance Spring For Fast, Easy Elevation
New Lightweight Tubular Supports For Greater Strength
New Cylinder Design For Fast, Easy Elevation
Globe-Type Needle Valve For Releasing Oil From Bottom of Cylinder
New Pump For Two Elevating Speeds
Worm and Gear Rotation For Easy Turning

NEW WAY TO GET UP IN THE WORLD

The Holan 2500 Manually-operated Hydraulic Ladder does things no other mechanical ladder can do. With a low-pressure hydraulic system and center mast counterbalancing, the 2500 raises and lowers fast and easy—in a matter of seconds. Elevating locations are infinite; and the angle of elevation can be changed with ladder fully extended . . . safely and without effort.

Other new features of this newest Holan work-simplifier include tubular ladder supports for lighter weight and greater strength; rotation crank located at rear for easier turning, better view and maximum clearance between ladder and body side; and an optional duo-level platform that assures level footing even at lowest angles.

Write for information about the latest addition to industry's biggest and most versatile aerial ladder family.

Holan 2500 Manually-operated Hydraulic Ladder with new duo-level platform. Available for 24′, 28′ and 32′ platform-to-ground heights.

Line construction bodies for light to heavy-duty. Crew compartments optional. Efficient tool compartments and drawers.

Service bodies for chassis up to 1½ ton. Lengths, 72″, 75″, 84″, 90″, and 102″.

Power derricks designed for front or rear mounting. Capacities to 12,000 lbs. Handle poles to 75 feet.

Ladders to 40′ with all phases completely hydraulic. Pump actuated by P.T.O. or separate engine drive with electric starter. Also, expertly-engineered mechanical ladders to 32′.

Portable hydraulic and mechanical earth borers. Augers for 8″ to 20″ diameters, depth to 8′.

Hydraulic towers from 17′ to 30′ with rotary, stationary, or transverse platforms. Exclusive box-girder telescoping mast.

J.H. HOLAN® CORPORATION

4100 WEST 150TH STREET
CLEVELAND 11, OHIO

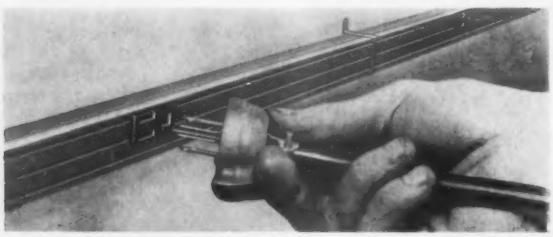
OTHER PLANTS:
HOLAN Thrift Line CORP., Griffin, Georgia • J. H. HOLAN CORP., Phoenix Div., Arizona
BRANTFORD-HOLAN LIMITED, Brantford, Ontario

THE NAME THAT MEANS WORK SIMPLIFICATION

PRODUCT NEWS

New Designs and Applications

(1) First microwave transmission of graphic material is witnessed here by Homer Marrs, Motorola Inc., and Chester E. Upson, Texas Illinois Natural Gas Pipeline Co. The pipe-line company has the first application of the new dimension in communications by Motorola Inc.



Branch-Circuit Raceway

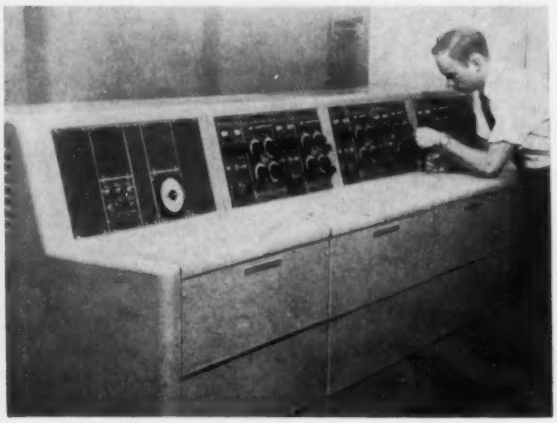
(2) National Electric Products Corp., Gateway Center, Pittsburgh, Pa.

This company's Plug-In Strip provides an integral raceway for addition of branch circuits along with its regular use for electrical outlets. Branch circuits, 110 and 220 v, can be carried in the same duct as the Plug-In Strip harness. UL listed for installing up to three No. 10 type TW electrical conductors in the raceway space.

Compression Dead-end Connector

(3) Burndy Engineering Co. Inc., Norwalk, Conn.

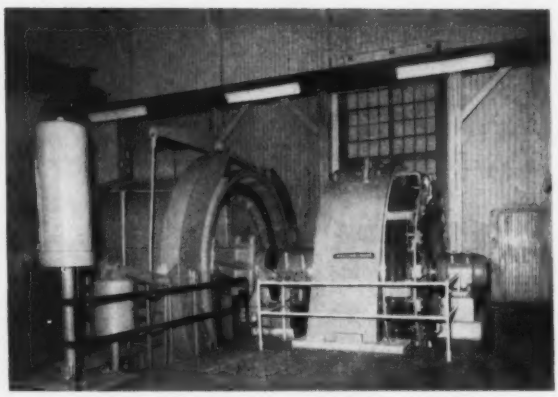
Two basic components make up this new compression dead-end connector. First is a cast EC aluminum body, second is a headed steel splice. The manufacturer says that properly installed, the connector develops a greater holding strength than the minimum rated strength of the conductor it is designed for. Suitable for conductors ranging from 1/0 through 336.4 MCM. The aluminum body is steel reinforced.



Automatic Dispatching System

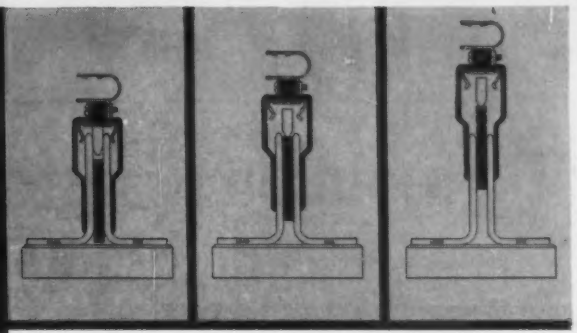
(4) General Electric Co., Instrument Department, Lynn, Mass.

Equipment called Automatic Dispatching System has been developed by this company for automatic, minute-by-minute adjustment of electric generating station output to the consumer demand. Reports are that ADS eliminates detailed scheduling and manual adjustments necessary for demand fluctuations. It is said that ADS automatically compares the production cost of each turbine generator in a utility system with area load requirements and adjusts turbine operation for the most economical and effective power production.



(5) THE FIRST man and material hoist drive to have Magamp magnetic amplifier control of Westinghouse Electric Corp. is this unit in the Kelley mine of Anaconda Co., located at Butte, Mont. The control is a current limit magnetic amplifier working in conjunction with a Rototrol regulator to control the operation of the hoist's 2,250-hp, d-c drive motor. It gives improved acceleration and deceleration, and also smoother operation. Mechanical stress on the hoist equipment is thus reduced. Control panel is far right

The Vacu-Break action is shown by a manually actuated demonstration model of a switch-head. A section of the arc-restricting chamber has been cut away to picture the operation.



1. "ON" POSITION—head has been thrust down on stationary line and load contacts. Contacts engage a self-aligning copper slug, completing circuit and reinforced by the Clampmatic pressure spring to assure a bolt-tight contact.

2. SWITCHING TO "OFF"—head is carried swiftly upward by operating bail, aided by Clampmatic® pressure springs. Arcs are smothered instantly because oxygen and ionizable gas in chamber are restricted.

3. FULL "OFF" POSITION—stationary line and load contacts are completely covered and remain in slots of chamber, assuring positive alignment and maximum safety. Chamber also acts as seal against dust and dirt.

Switch to Clampmatic Vacu-Break

FOR GREATER SAFETY

AND LONGER SWITCH LIFE

Famous BullDog principle restricts arcing, increases product life!

A switch to Vacu-Break® means money saved through elimination of costly maintenance! Vacu-Break is the exclusive principle which has won BullDog safety switches, bus plugs, power-panels and switchboards an enviable reputation for superior performance.

In these and other BullDog products, it's the unique Vacu-Break action which smothers arcs. It eliminates the maintenance ordinarily caused by excessive arcing . . . and with it the high cost of "upkeep" and frequent replacements. Products employing the Vacu-Break principle have a longer life!

It's just one more demonstration of BullDog's ability to provide electrical products which offer advantages in installation, convenience, safety and flexibility. Consult your BullDog field engineer or write: BullDog Electric Products Company, Detroit 32, Michigan.

© BEPCO

IF IT'S NEW . . . IF IT'S DIFFERENT . . . IF IT'S BETTER . . . IT'S

BULLDOG

ELECTRIC PRODUCTS COMPANY

A Division of I-T-E Circuit Breaker Company

Export Division: 13 East 40th Street, New York 16, N. Y. • *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Road, Toronto 15, Ont.

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

COAST ELECTRIC & MANUFACTURING CO.
1733 N.E. Seventh Avenue, P.O. Box 7712
Portland 12, Oregon

YOUNG ELECTRIC & MFG. CO.
2134 Curtis St.
Denver 2, Colorado

SAFETY SWITCHBOARD COMPANY
910—89th Avenue
Oakland 21, California

BULLDOG ELEC. PROD. CO. OF LOS ANGELES
2885 E. Washington Blvd.
Los Angeles 23, California

Distribution Transformers

oil-askarel-dry

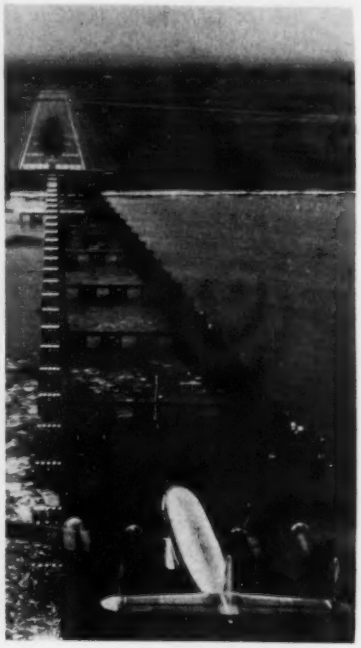
"Transformers that stay in service"

Domestic Territories open for Qualified Representatives

Northern California Representative
THE BAXTER CO.
101 Kansas St., San Francisco, California

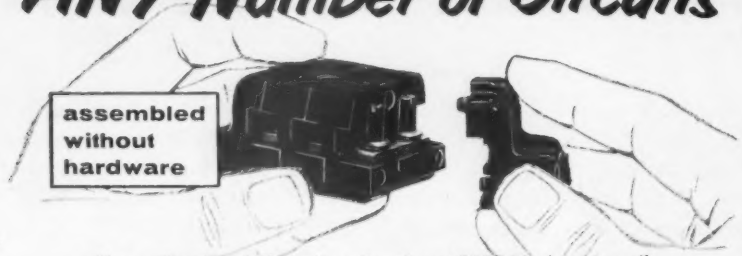
Export Representative
JAMES S. BAKER COMPANY
311 California St., San Francisco, California

HILL TRANSFORMER CO., INC.
1030 WASHINGTON ST., SAN CARLOS, CALIFORNIA



(6) High-intensity lights in a new electronic flash approach system guide pilots to safe landings at New York's Idlewild airport. The new-type system, designed by Sylvania Electric Products Inc., is said to resemble a "white-hot football traveling 2,700 mph"

ANY Number of Circuits



New self-covered 750 volt sectional pres-SURE-blocks are available either as completely assembled "one-piece" terminal blocks or in separate sections for user's assembly.

Sections with factory installed contacts are available in either a slip-fit design for hand assembly and disassembly or a pres-fit design for permanent assembly by means of a simple fixture.

Contacts are available for either stripped wires (#18 thru #4, to 70 amp's) or for looped or terminal-ended wires (#8 and smaller, to 35 amp's); latter featuring exclusive "captive" screws.

Write for Bulletin V-2

pres-SURE-block Sections

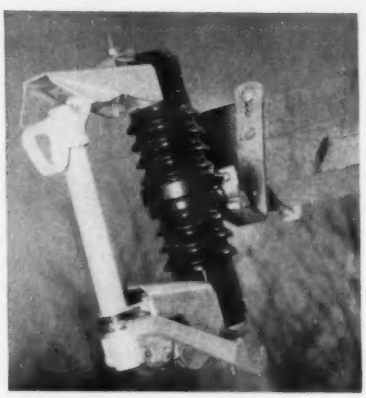
Assembled pres-SURE-blocks

"One-Piece" Terminal Blocks

AN Type Terminal Strips

BUCHANAN
ELECTRICAL PRODUCTS CORPORATION
HILLSIDE, NEW JERSEY

IN CANADA / Gasaccumulator Co. (Canada) Ltd., 12 Gower St., Toronto 16, Ontario



Loadbreak Cutout

(7) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Interruption of both load and fault current is in the capability of this new device. Cutout performs in a conventional manner while interrupting fault current, with fuse link blowing and fuse holder dropping out. To interrupt load current, the fuse link is broken mechanically by a lever-operated toggle mechanism located at the lower end of the fuse holder. Available in ratings of 5.2, 7.8 and 15 kv.

He's coming to help you

He is a Bell System communications engineer. His purpose is to help you speed your operations, cut your costs and improve your service—by making sure your communications meet your exact requirements.

The Bell System offers a wide variety of private line services, including telephone, teletypewriter and mobile radio systems. And the Bell System tailors these facilities to meet specific individual needs, so that you maintain high-speed contact between your various departments, branches, factories, warehouses, as well as between you and your suppliers, customers, distributors and shippers.

Why not let a Bell System communications engineer make a study of your communications requirements and recommend the kind of service, or a combination of services, which will best meet your specific needs?

• • •

His survey is free and his recommendations are yours without obligation. You can reach him by calling your nearest Bell Telephone business office.

BELL TELEPHONE SYSTEM

TELEPHONE TELETYPEWRITER TELEMETERING AND REMOTE CONTROL CHANNELS

Why Pay 3 MEN to Watch Your Line Crew Work?

START SAVING TIME and MONEY with

TEL-E-LECT 2-MAN UTILITY RIGS

If you're using 5-man crews and old fashioned utility equipment (even on '55 chassis) you've got *three extra men on most jobs!*

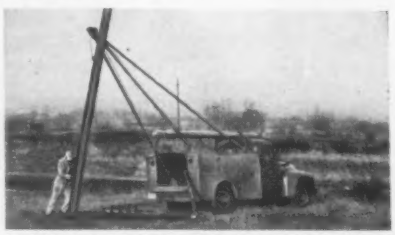
With Tel-E-Lect equipped trucks you'll discover the great time and money saving advantages of 2-man construction trucks. Leading public utility companies throughout the country are now using 2-man trucks to do a large share of the work once performed by 5-man crews—and they're realizing increased profits in the process.

Your 2-man crew won't work any harder, but they'll produce more and do it faster than many 5-man crews. You see, Tel-E-Lect builds the services of three men into its utility truck equipment. Tel-E-Lect equipment provides new power features that require only two men to perform the tasks once done by five!

The 2-man construction equipment described here lets you put smaller crews on everyday jobs while freeing big crews and big equipment for the really tough highline jobs.

THE TEL-E-LECT COMBINATION BODY

This *complete* package consists of a rugged steel body, stowaway derrick, winch and drive, pole hole digger and drive and rapid forward-reverse transmission. Three simple installation steps by your local mechanic puts the Combination Body on your truck chassis regardless of make or model. You simply install power take-off . . . mount body and connect power drive . . . and install cab controls. It's now ready to go to work!



A Tel-E-Lect all steel Combination Body is completely equipped with Stowaway derrick, digger and power units—a model 2-man construction truck.

Front mounted Tel-E-Lect "T" frame derrick and Tel-E-Lect Pole Hole Digger gives this utility truck 2-man versatility.

WINCH, DIGGER AND DRIVE KITS FOR ALL POPULAR-MAKE TRUCKS

A series of easily installed Tel-E-Lect kits make it possible to install derricks, diggers and power drives at the front of your present utility truck. The flexibility and economy of 2-man operation can be extended to any size or model of International 4x4, Ford, Chevrolet, GMC, Dodge or other truck.

These Tel-E-Lect kits are designed specifically for the particular truck on which they will be installed. Each kit contains every part needed for easy installation by your local mechanic.

TEL-E-LECT SELF-STORING DERRICK CONVERSION KITS

An entirely new concept of derrick storage eliminates the hazards once involved in derrick erection and take-down. Your front mounted "A" or "T" frame derrick stores on top of the truck—doesn't use valuable body space for storage.

Your truck's winch supplies power to raise or lower derrick. With a double drum winch you'll get "live-boom" flexibility and with a single drum winch you'll get easily adjustable derrick elevation! This low cost unit fits any truck with or without body and is quickly installed.

This 2-man construction truck features a front mounted Tel-E-Lect T-45 derrick and Tel-E-Lect Self Storing Derrick Conversion. The derrick is shown in its stored position in the smaller photo.

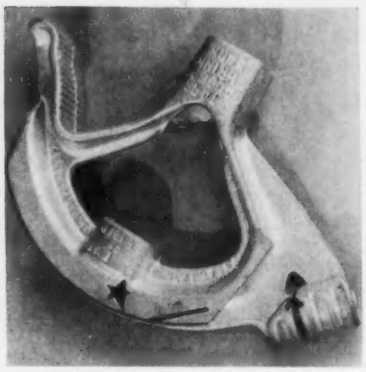
Tel-E-Lect provides other kits for individual requirements. Write us about any of your utility truck problems.

TELE-LECT PRODUCTS INC

TEL-E-LECT PRODUCTS, INC.

10,025 Minnetonka Blvd., Minneapolis 26, Minnesota

Distributed by: Am. Equipment & Body Co., Los Angeles 33; Robbins's Utility Equip. Co., Seattle; Sagvaro Body & Equip. Co., Phoenix, Ariz.; Utility Body Co., Oakland 7; Williamsen Body & Equip. Co., Ogden, Utah



Conduit Bender

(8) National Electric Products Corp., Gateway Center, Pittsburgh, Pa.

Easy portability and one-piece construction are two outstanding features of this new bender for both rigid and thin-wall conduit. The manually operated bender is designed to be its own measuring unit and the length of the tool equals its own take-up. Said to be factory prestressed to a load of 16 tons.

Smaller Breaker Tanks

(9) Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.

Reduced tank height and diameter for some types of circuit breakers have been achieved by this manufacturer. Easier handling and elimination of a bushing adapter flange are two reported advantages. A standard skid mounting provides necessary room for the breaker drain pipe, doing away with extra space formerly required by a skirt. Diameters were reduced by improving efficiency of interrupting devices.

New Cable Package

(10) Carol Cable Co., 190 Middle St., Pawtucket, R. I.

This manufacturer's lamp cord now comes in four packages containing 1,000 ft each instead of the former practice of shipping 2,000 ft to a container. S and SJ cord is now available one spool to a package instead of four spools per carton.

For manufacturers' bulletins with additional information on these products, fill in coupon on page 76.

NEW SERVICE ENTRANCE CABLE FROM KAISER ALUMINUM!

Provides initial material savings over copper. Lower cost combined with advantages in handling and installation means you realize new benefits when you specify Kaiser Aluminum Service Entrance Cable, Type SE—Style U.

Increased service capacity for adequate wiring. Because of its substantially lower cost, aluminum permits you to increase service capacity without increasing costs. As a result, service entrance construction in your adequate wiring program can be accomplished at less expense.

Eliminates bi-metallic connectors at weatherhead. There is no need to join service entrance cable and service drop cable with expensive bi-metallic connectors when you specify aluminum for *both* constructions.

Neoprene covering provides superior protection. Kaiser Aluminum Service Entrance Cable gives you neoprene jacketed construction at no extra cost over the usual braid covered cable. In areas where requirements permit, this cable may be used without conduit attached to the sides of buildings and through walls. In addition, the neoprene jacket can be painted, will not mar siding, and is far neater in appearance than braid covers. Unlike braid, neoprene withstands rough handling without breaking.

Can be used as service drop to eliminate weatherhead. Kaiser Aluminum Service Entrance Cable is light enough to be used as a service drop cable, if desired, to eliminate splices at the weatherhead. Also, where attachments to buildings are low because of house design, this new cable meets National Electric Code requirements for minimum clearance.

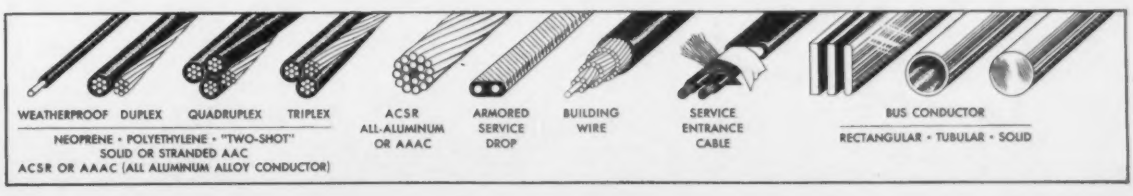
Available in many constructions. New Kaiser Aluminum Service Entrance Cable is available solid and stranded in two- and three-conductor cables. AWG Sizes 10, 8, 6, 4, 2 and 1, with neutral conductor equal to or two sizes smaller than power conductors. These constructions exceed the Underwriter's Laboratory standards for rubber covered wires and cable.

For more information, contact any Kaiser Aluminum sales office or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois; *Executive Office,* Kaiser Bldg., Oakland 12, California.

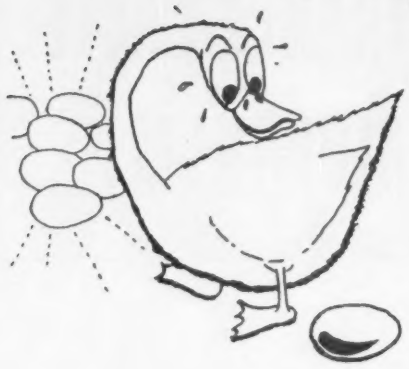
KAISER WIRE

Kaiser Aluminum

The nation's largest producer of triplex and aluminum weatherproof conductor



all that glitters...



. . . is not necessarily gold, or for that matter, gold-plated. Take photoelectric lighting controls, for example. A low *price* tag may make one *look* like a big, shiny bargain — but it tarnishes pretty fast when the maintenance bills begin piling up.

Fisher-Pierce controls, on the other hand, honestly offer the advantage of first cost offset by savings in wiring, labor, materials and minimum maintenance. (One typical electric company*, who made their initial installation in 1946, now has more than 3000 Fisher-Pierce controls in service. They report low installation costs and during the 12 months of operation in 1953, the failure rate experienced was 2.29% of all units in service.) Net result in the long run is that *dependable* F-P control costs no more than the seeming "bargains."

*Name on request

Fisher-Pierce will be glad to send you technical data and information on request. Write today.

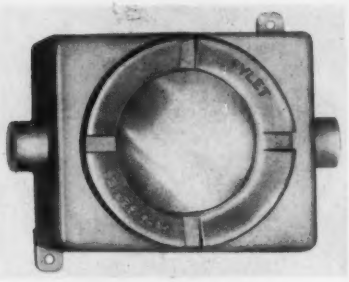
THE FISHER-PIERCE CO., INC.
43 Pearl Street, So. Braintree, Boston 85, Mass.

EXPORT:
Philips Export Co., 100 E. 42nd Street, New York 17, N. Y.
In Canada:
Northern Electric Co., Ltd.

EARL S. Condon COMPANY
Engineering Representatives

- Burndy Engineerign Co.
- Carma Manufacturing Co.
- Cole Electric Co.
- Lapp Insulator Co.
- P-W Industries, Inc.
- Pacific Oerlikon Co.
- Preformed Line Products Co.
- United States Rubber Co. Wire & Cable Division

3460 WILSHIRE BLVD. • LOS ANGELES 5, CALIF.
PHONE: DU 1-3951 • TWX: LA-795



Explosionproof Enclosure

(11) Pyle-National Co., 1334 N. Kostner, Chicago, Ill.

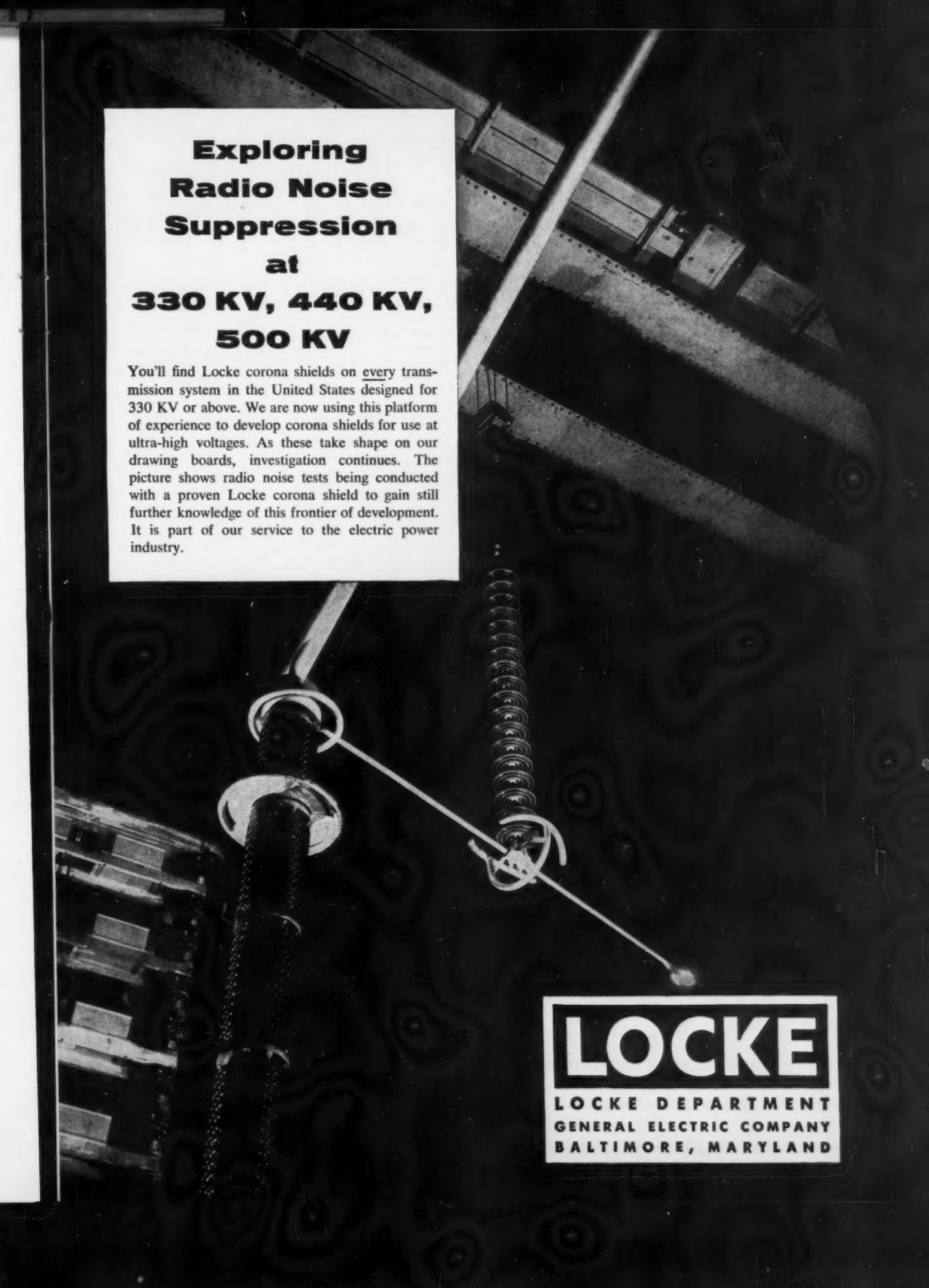
This manufacturer has developed a new series of instrument enclosures that allow readings without opening the covers. Designed to accommodate meters, gages or similar devices. Equipped with threaded cover and a heavy round glass window, the units are supplied in four body sizes with ¾-in. hubs for rigid conduit in both dead-end and through-feed types.

Reversible Auger Teeth

(12) Petersen Engineering Co., Santa Clara, Calif.

New reversible teeth for earth boring augers and cutting heads are announced by this company. They are said to have longer wearing surface and are positioned to bore without down pressure. Reversing takes place after one side has been worn out. Elimination of down pressure in most normal uses is said to relieve clutch wear and waste of power. No. 49 is for heavy-duty boring machines; No. 41 for light and medium equipment.

(13) **POWER BLOCKS**—This series of heavy-duty extension cord power blocks brings a set of four convenience outlets within easy reach of applications. Produced by Rodale Mfg. Co. Inc., Emmaus, Pa. Extensions are in lengths of 6, 12, 25 and 50 ft.



Exploring Radio Noise Suppression at 330 KV, 440 KV, 500 KV

You'll find Locke corona shields on every transmission system in the United States designed for 330 KV or above. We are now using this platform of experience to develop corona shields for use at ultra-high voltages. As these take shape on our drawing boards, investigation continues. The picture shows radio noise tests being conducted with a proven Locke corona shield to gain still further knowledge of this frontier of development. It is part of our service to the electric power industry.

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

Power...

to make dreams come true

From Fantasyland to Tomorrowland, Marcus Transformers provide trouble-free, uninterrupted service in Disneyland—fun capital of the world. Your business, too, can profit by using the transformers that are setting new standards for the industry. For transformers that exceed specifications, order—*MARCUS.*

A complete line of dry type and liquid-filled transformers through 5000 KVA.

MARCUS
TRANSFORMER CO., Inc.
RAHWAY, NEW JERSEY
"Mark of Quality"
Representatives in Principal Cities

ALL NEW!
BRONCO *Certified* **66**
NEW 66% NEOPRENE JACKET
portable electrical cords and cables

FAR IN THE LEAD!

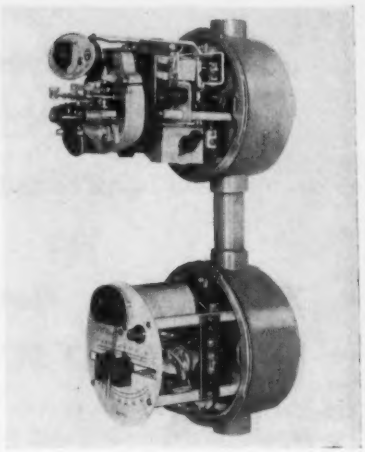
IN TOUGHNESS 67.32% Neoprene—certified by a registered professional engineer—makes Bronco 66 Certified the toughest cable ever placed on the market. Supreme resistance to oil, flame, sunlight, ozone, acids, abrasion . . . all of the natural enemies of cords and cables.

IN FLEXIBILITY A completely new Synchro-Cure process—a method of vulcanization used only by Bronco—produces incredible flexibility. Tests have proved that Bronco 66 Certified is 20.33% more flexible than the average of all competitive cords tested, including widely-advertised brands.

IN TOTAL VALUE Jackets are BRANDED every two feet. Packed in new shelf cartons with knock-out centers; cables are wound on 250', 500', and 1000' returnable reels. Large, easy-to-read labels. Made in a complete range of types and sizes—SO, W, G, Control Cable, Welding Cable, SJO, SV-Neoprene.

now available internationally through Electrical Wholesale Distributors . . . write for new free catalog

manufactured by
WESTERN INSULATED WIRE CO.
Los Angeles 58, California



Voltage Control

(14) Line Material Co., 700 W. Michigan St., Milwaukee 1, Wis.

A current-modified voltage control, designed to actuate oil switches for capacitor bank operation, is being offered by this company. It consists of a voltage control and a current control, with the voltage control directly initiating switching action. The current control changes the operating level of the voltage control by removing or inserting a bias voltage. Design simplicity of this economy device is said to give years of trouble-free service.

First Aid for Burns

(15) E. D. Bullard Co., 275 Eighth St., San Francisco 3, Calif.

First aid ointment for burns is now packaged in spray containers by this company. Said to have both anesthetic and antiseptic qualities, the solution can be used either directly on the burn or on wet dressings. Available in 3-, 5- or 11-oz containers, for convenient storage in tool kits, glove compartments or medicine chests.

Phasing Transformer

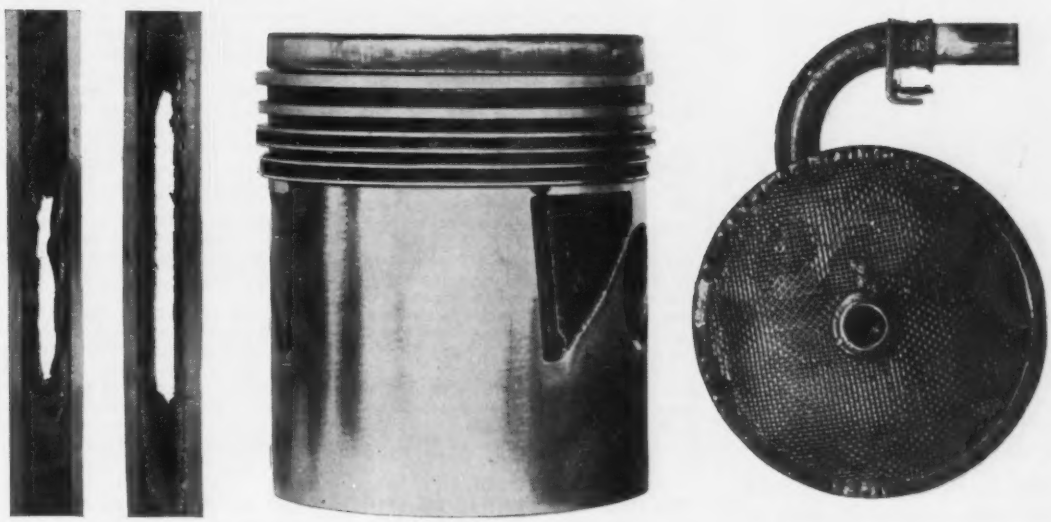
(16) Elastic Stop Nut Corp. of America, A'G'A Division, Elizabeth, N. J.

A new phasing transformer pressure molded in rubber to insure greater safety for troublemen and line crews in phasing out and checking primary voltages has been developed by this company. The complete assembly includes transformer, connectors, rubber insulated hanger, two plug-in high-voltage leads, a plug-in lamp socket and a plug-in instrument lead. The hanger is for easy mounting of the unit on a convenient cross member.

Standard Engineer's Field Report

CASE HISTORY
LUBRICANT RPM 10-30 Special Motor Oil
FIRM Yellow Cab Co., Stockton, Calif.

New oil increases oil mileage up to 45%, gas mileage up to 10% for fleet operator



WITH RPM 10-30 SPECIAL MOTOR OIL in their fleet of 32 taxis, the Yellow Cab Co. of Stockton, Calif., was able to boost oil mileage up to 45%, gasoline mileage up to 10% resulting in substantial savings in each vehicle. Oil ring plugging was practically eliminated. Note in photographs above how ring at left (lubricated with conventional heavy duty SAE 30 grade oil) is almost completely clogged after 30,000 miles of service. Ring on right (using "RPM 10-30 Special") is still free and clear, meaning less oil consumption, increased protection against wear. Clean piston (center) and oil screen (right) show how this new multi-grade oil held deposits to a minimum. A typical unit in the fleet had a daily average of 55% driving, 5% stopped with engine idling, 40% stopped with engine off—and made 25 engine starts.

10-30 SPECIAL RPM MOTOR OIL

TRADEMARK "RPM" REG. U. S. PAT. OFF.

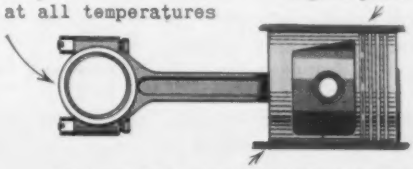
As a result of these savings in oil and gasoline consumption, the company now uses RPM 10-30 Special Motor Oil exclusively in all vehicles.

FOR EXPERT HELP on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative, or write to 225 Bush Street, San Francisco, California.

Why RPM 10-30 Special Motor Oil cuts operating costs

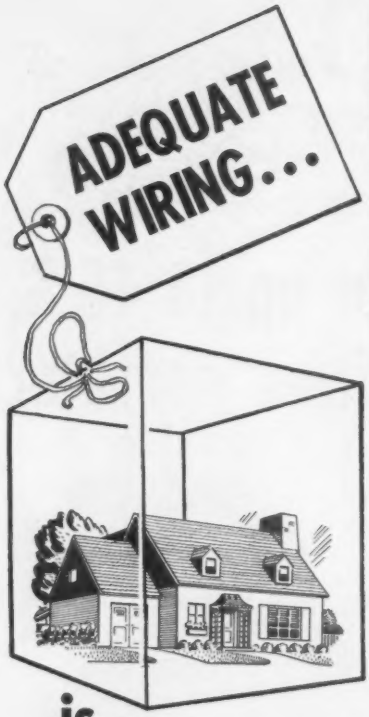
Multi-grade insures complete lubrication at all temperatures

Detergent keeps engine parts clean



Anti-oxidant resists deterioration of oil and formation of lacquer

STANDARD OIL COMPANY OF CALIFORNIA



is

KNOB and TUBE WIRING

Adequate wiring—as recognized nationally—represents plenty of convenience outlets and controls, properly located — and backed by large capacity electrical wire.

Any size electrical wire will carry *more current* with *Knob and Tube* wiring! Surprised? Most people are. Check the facts! Tables I and II of the National Electrical Code provide complete comparisons. You get 33% to more than 100% *extra capacity* with *Knob and Tube* wiring—the *first* approved wiring method in NEC. Still the best. Still unchallenged!

Specify Knobs and Tubes by Porcelain Products—synonymous with reliability for 62 years.

62 years ELECTRICAL PORCELAIN SINCE 1894 PP INC.

Porcelain Products, Inc.
FINDLAY, OHIO

BULLETINS ETC.

(17) ELECTRICAL STANDARDS—"The 400 American Standards in the Electrical Field" is a new publication of the American Standards Assn. It indexes and describes each American standard in the electrical field and will help the user to find the applicable standard on the product in which he is interested. Address is 70 E. 45th St., New York 17, N. Y.

(18) CABLE CATALOG — Okonite Co., Passaic, N. J., now has, upon request, its latest catalog of all products, including trade names and applications. Two selection charts for cables are included.

(19) CORROSION PREVENTIVE—"Eleven Ways to Avoid Boiler Tube Corrosion" is the name of a bulletin available from Babcock & Wilcox, Tubular Products, Beaver Falls, Pa., a compilation of data assembled by the Babcock & Wilcox metallurgical staff.

(20) HYDRAULIC TURBINES — Bulletin 1001 of Baldwin-Lima-Hamilton Corp., Hydraulic Turbine Dept., Philadelphia 42, Pa., carries full information about principles, illustrations and data on basic types of hydraulic turbines and accessories.

(21) RELAYS—AEMCO Inc., Mankato, Minn., has just released a four-page bulletin covering wide variety of relay types. Complete specifications are given for each relay. Contains mounting information, enclosures available and basic size information.

(22) SALES MANAGEMENT — "Who's Selling Who?" is the title of a new sales management brochure available from Cappel-MacDonald & Co., 129 S. Ludlow St., Dayton 1, Ohio. It is a fresh approach to an old sales problem—getting men to sell.

(23) HEAT-RESISTANT CABLES—Typical test results for Keystone butyl rubber insulation under conditions of high heat and extreme moistures are given in this new data book. Ask for bulletin H-463, The Okonite Co., Hazard Division, Passaic, N.J.

(24) HEAT RADIATION—A discussion of the laws of physics that apply to heat flow is contained in this booklet. Presented are experiments, insulating techniques, specifications and descriptions of Infra Insulations. Write to Infra Insulation Inc., Dept. 30, 525 Broadway, New York 12, N.Y. Title is "Heat Flow by Radiation in Buildings, Simplified Physics."

(25) POLE-PROTECTION ANALYSIS—A new service, analyzing creosote retention of pine poles for maintenance purposes, is described in a bulletin available from Osmose Wood Preserving Co. of America, Utilities Division, 980 Ellicott St., Buffalo, N.Y.

(26) METAL RACEWAYS — National Electric Products Corp., Pittsburgh 22, Pa., is offering a new catalog devoted to 4x4 and 6x6 Wirewa metal raceways.

(27) FARM BROODING — The use of infrared heat for brooding and many other applications on farms is the subject of this booklet by Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y. Covered are operating costs and the importance of light, safety, flock size, lamp placement, litter management and electric recommendations.

KILL TWO BIRDS WITH ONE STONE — Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after April 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

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21 22 23 24 25 26 27

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NAME..... TITLE.....

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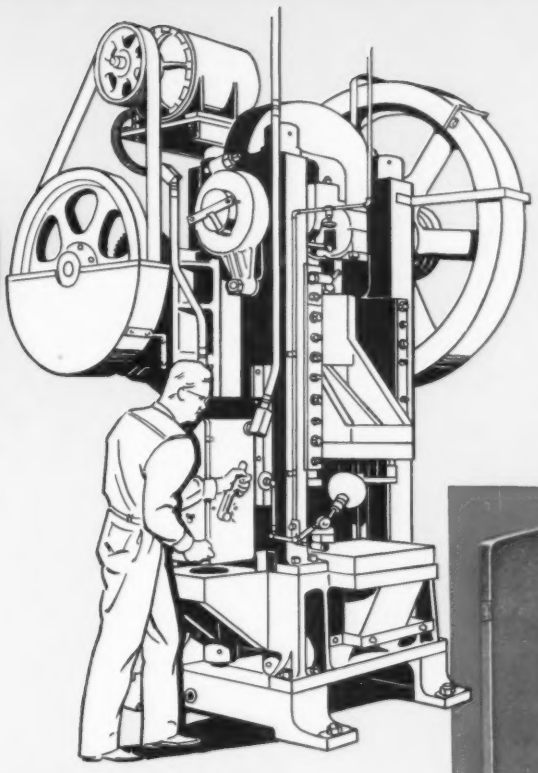
ADDRESS.....

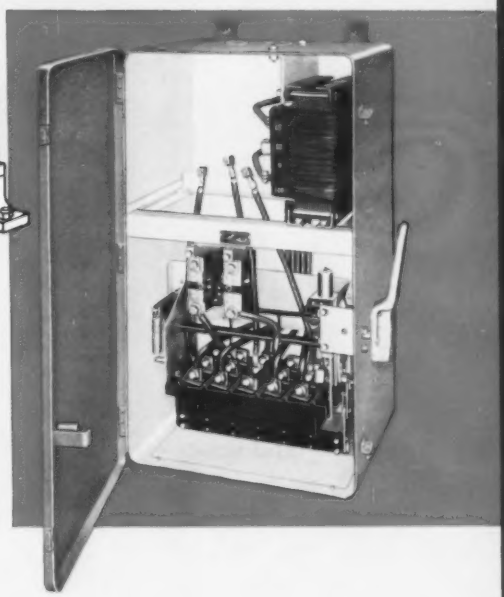
CITY..... ZONE..... STATE.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

The Sign of
QUALITY
Motor Control



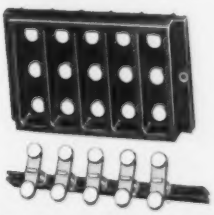
Bliss No. 207 Press in the plant of V. W. Danielson Manufacturing Co. It is started with an Allen-Bradley Bulletin 646 manual autotransformer starter, as shown below, with cabinet open to show air-break contacts and reduced voltage transformer.



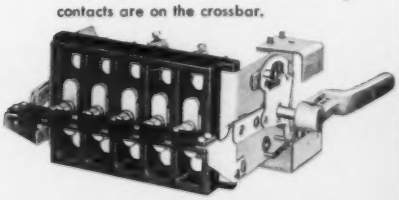
BULLETIN 646

MANUAL AUTOTRANSFORMER STARTERS with AIR-BREAK CONTACTS up to 75 HP, 220 V; 150 HP, 440-550 V.

Stationary and Moving Contacts of Bulletin 646 Reduced Voltage Autotransformer Starter



Cadmium silver stationary contacts are mounted in the arc hood and the moving contacts are on the crossbar.



Simple switching mechanism which first connects motor to reduced voltage taps and then shifts it to full line voltage.

Freedom from messy, oil-immersed starter contacts and oil tanks . . . that's the outstanding advantage of Allen-Bradley Bulletin 646 autotransformer starters up to 75 hp, 220 v; 150 hp, 440-550 v. This range covers most squirrel cage motors. The air-break, cadmium silver contacts need no maintenance.

The starting lever is so interlocked that the operator must pull the lever FIRST to the START position. After a preset, adjustable interval, a bell rings to indicate when the lever should be pushed into the RUN position. The starter is held in the RUN position by a magnetic latch, which drops out and stops the motor in case of overload or line failure.

In flour mills, grain elevators, and other places with explosive dust hazards, oil-immersed contacts must of necessity be used. For such applications an oil tank and copper-to-copper contacts can be supplied. Write for Bulletin 646.

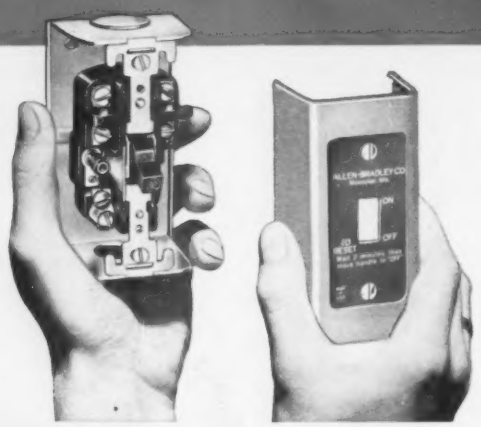
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

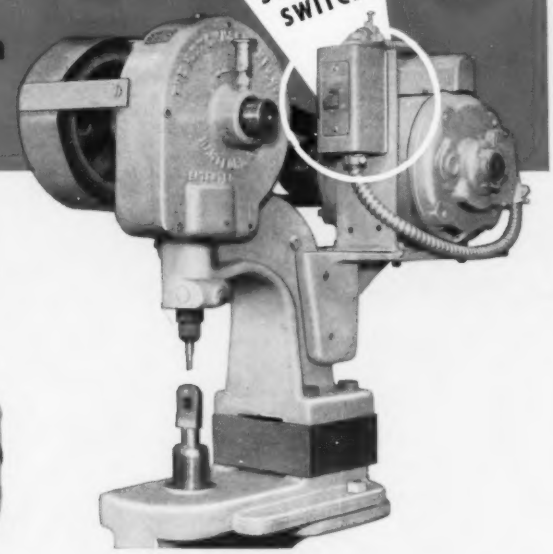
2-56-M

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

SMALL MOTORS
need overload protection too!

BULLETIN 600 STARTING SWITCH





Because

SMALL MOTORS CAN BE AS IMPORTANT TO PRODUCTION SCHEDULES AS LARGE MOTORS

Here is an outstandingly popular starter for applications using motors of ONE HORSEPOWER OR LESS.

It is a small, manually operated starter that is equipped with a time-tested, reliable A-B overload breaker. A soldered ratchet trips the operating lever in case of a sustained overload. It is reset, after tripping, merely by moving the operating lever to the OFF position. Overload heater elements are available to cover the ratings of this starter.

The Bulletin 600 starting switch is available in single and double pole construction. Its double break, silver alloy contacts provide high interrupting capacity. The contacts are always in good operating condition. They never need to be cleaned, filed or dressed. Please write for a copy of Bulletin 600 for complete information on the Bulletin 600 line.

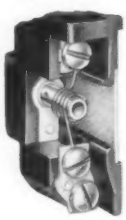
SIMPLE DESIGN

Simple ON & OFF snap switch . . . easy access to terminals . . . ample wiring space . . . silver alloy contacts need no cleaning or maintenance.

ATTRACTIVE APPEARANCE

Streamlined enclosure in grey enamel, and bonderized to assure positive binding of enamel finish to resist corrosion. The pilot light is optional.

OVERLOAD BREAKER



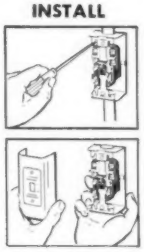
According to National Elec. Code ruling, motors of 1 hp or less, automatically started by thermostat, float switch, etc. must have overload protection.

FITS STANDARD SWITCH BOXES

Bulletin 600 starters fit any standard 2½ in. deep wall switch box.

Can be mounted in machine frame or base. Available with pilot light.

EASY TO INSTALL

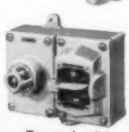


Remove 2 screws on front of starter . . . slip off cover . . . attach conduit . . . pull in wires and connect to terminals . . . replace the cover.

VARIETY OF ENCLOSURES

Type 7 for hazardous locations.

Type 4 watertight.



Type 4 with pilot light.

Allen-Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

A-B Quality

ALLEN-BRADLEY
BULLETIN 600 STARTING SWITCHES
QUALITY

2-56-MR

INDIANA STEEL & WIRE CO. MUNCIE, IND.
Crapo Galvanizing

Signs along the lines of *Crapo* GALVANIZED STEEL STRAND PERFORMANCE

For dependable performance . . . insist upon *Crapo* Galvanized Steel Strand. Superior tensile strength, combined with long-life, ruggedness and workability, makes *Crapo* Steel Strand first choice for guys, messenger and overhead ground wire.

The famous *Crapo* galvanizing process provides dependable protection for the steel, prolongs the expectant life of the strand.

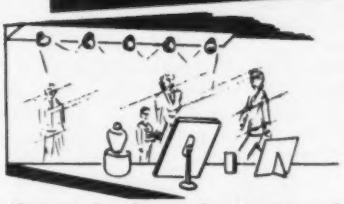
- Low maintenance cost
- Laboratory tested and controlled quality
- Meets highest quality standards
- A size and grade for all practical needs
- Contact your *Crapo* Jobber Today!

INDIANA
STEEL & WIRE CO., INC.
Muncie, Indiana

One Fixture Cost . . . One Installation Cost

NEO-RAY ROTO-STRIP
C.S.A. APPROVED Pat. Pend.

FOR WINDOW LIGHTING



Above window shown with corner mounted Roto-Strip. Merchandise is emphasized with beams of light from all angles from single fixture.

This complete shallow unit (available for surface, corner or recessed mounting) has built-in recessed roto sockets that swing 90° in all directions through a complete 360° circle . . . and stay put at any angle. Available in stock sizes of 2'—3'—5' and 8' lengths.

Surely Roto-Strip has a place in your plans.

California Nevada	Washington Oregon • Idaho
Robert J. Arthur 420 Market St. San Francisco 11, Calif.	Richard English 3814 N.E. Wasco St. Portland, Ore.

Mfrd. by: NEO-RAY PRODUCTS, INC., 315 E. 22nd St., New York 10, N. Y.

ELECTRICAL BOOKS

THE MODERN BUILDING ENCYCLOPAEDIA, *766 pages, 6x9, edited by N. W. Kay, Philosophical Library, $15.*

A completely new, comprehensive reference is the result of contributions from more than 30 specialists with wide practical experience as lecturers and instructors in their subjects. It is designed to cover the requirements of the contractor, the craftsman, the student and the apprentice. Nearly 4,000 entries from an up-to-date guide to all the terms used in the theory and practice of present-day building techniques.

ASTM STANDARDS ON PLASTICS, *790 pages, 6x9, American Society for Testing Materials, $5.75.*

Tentative specifications, methods of analysis, methods of physical testing, recommended practices and definitions of terms pertaining to plastics are contained in this book. Of a total 143 specifications and tests, four are new and 41 are changed from the May 1954 edition. Reflected are the combined experiences of producers and consumers of plastics. Contains five electrical tests and one recommended practice.

ELECTRONIC ENGINEERING, *525 pages, 6x9, by Samuel Seely, McGraw-Hill Book Co., $8.*

Here is a detailed discussion of a large variety of electronic circuits that are important in such fields as radar, television, electronic control and instrumentation and computers. Begins with a general introduction to tubes and tube circuit principles and proceeds into a detailed consideration of the more important electron tube circuits. Emphasis is placed on physical and mathematical analyses.

ELECTRICAL CIRCUITS, DIRECT AND ALTERNATING CURRENT, *510 pages, 6x9, by Charles S. Siskind, McGraw-Hill Book Co., $6.75.*

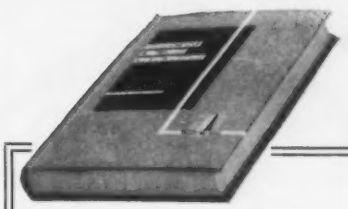
This is a two-semester text on the fundamental principles of electric and magnetic circuits. Designed for use at college, technical institute, vocational school and industrial levels. Discussions progress from simple relationships to those of complex nature. Emphasis is on practical application and operations.

ATOMIC ENERGY—THE NEW INDUSTRIAL FRONTIER, *254 pages, 8½x11, Atomic Industrial Forum, $5.*

This is a collection of the proceedings of a two-day Forum meeting jointly sponsored with Stanford Research Institute in San Francisco, April 1955. Includes papers on food and agriculture, specialized uses of reactors, reactor safety considerations, nuclear fuels and various other industrial-use topics.

THE ENGINEERING SOCIETIES DIRECTORY, *Engineers Joint Council, $3.50.*

Information is due now for listing in this new publication. Your engineering society should have questionnaires on hand. If not, they are available from Engineers Joint Council, 29 W. 39th St., New York City. Publication is tentatively set for June 1. The directory is a new publication and not a revision of the discontinued yearbook.



ELECTRICAL ESTIMATING

JUST OUT! Information you need to estimate the cost of any electrical construction job quickly and accurately. Covers everything from selection and training of estimators, and proper use of estimating tools—to cost of preliminary estimates, and preparation of final bid sheets. Second Edition devotes an entire section to discussion of labor units, and includes 12 pages of over 500 sell price units. **By Ray Ashley, Elec. Engrg. and Estimating Consultant, and Consulting Ed., Electrical Construction and Maintenance. Second Ed. 363 pp., 208 charts, illus., and sample estimates, $8.00.**

PREVENTIVE MAINTENANCE OF ELECTRICAL EQUIPMENT

JUST OUT! Add years to the life of your electrical apparatus with these sound methods for preventing, finding, and correcting electrical troubles. Gives specific ways for better operation and maintenance of electrical equipment—to help avoid breakdowns, reduce accidents, and make for more efficient performance. Shows how to find and identify common electrical troubles, and make emergency repairs. **By Charles I. Hubert, Assoc. Prof., and Chief of the Section, Elec. Eng., U.S. Merchant Marine Academy, N. Y. 214 pp., 160 illus., $4.00.**

ENERGY SOURCES The Wealth of the World

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ELECTRA'S HUSBAND

"Everybody's Guilty . . ."

"I'VE never been so embarrassed in my life," fumed Electra as we were driving north through the San Fernando Valley recently. "It used to be that when I spent a week with the girls in Los Angeles we'd talk about flowers, or plays or what to do when Junior fell off the back steps. This time all I heard was what they were going to do about smog. Not knowing anything about it, I could hardly open my mouth all week long."

"If what you say is true," I replied, "it would have been the first time that I had known you to be at loss for words. It must have been a very painful experience."

"Well it was, but it seems to me that if smog has become so important down here somebody should be doing something about it. I didn't get the impression that there was anything really cooking except a lot of conversation."

Having just come from a luncheon meeting where smog was discussed by one of southern California's foremost scientists, I could afford to be smug, at least I thought so at that particular time.

"Just what aspects of the smog situation would you like to discuss?" I asked magnanimously.

"Well," began Electra, "I heard all kinds of theories ranging from the ridiculous to the fantastic about smog and its causes. Pretty generally all the girls were cussing out, in a general way of course, industry in general and the oil refineries in particular for polluting the skies over their fair city. I even heard one heretic suggest that they ought to disband the Chamber of Commerce and begin a campaign to scare industry away from the area. Just why is it that Los Angeles should be so hard hit by smog anyway?"

"It's largely a problem of ventilation," I began to explain patiently. "In every large concentration of population the use of heat in one form or other is absolutely essential. To get heat you have to burn something. When you burn something you get fumes, smoke and chemical products. Some of these products, even though they are invisible in themselves, combine with air and sunlight to form visible particles. It just so happens that Los Angeles is so situated topographically that nature's ventilating system now isn't sufficiently adequate to carry away all the products that 4 or 5 million people produce thermally in order to live and to make a living."

"Just a minute," interrupted Electra blandly, "if it's only a problem of ventilation there ought to be an easy answer. You geniuses in the electrical industry are always looking for new ways to build load. Why wouldn't a few wind-tunnel fans do a job? It might take quite a bit of power but it seems to me that getting rid of smog would be cheap at any price for our Los Angeles neighbors."

"Don't think that it hasn't been thought of," I said, "but air isn't as light as most people believe. The scientist whom I heard speak on the subject recently pointed out that the air over the Los Angeles area, only to the altitude of 500 ft, weighs approximately 250,000,000 tons. If that figure stifles your imagination, think about a pile of steel 1,000 ft long, 1,000 ft wide and 1,000 ft high. Now try moving that steel about 50 miles out into the desert and back twice a day and you'll get a dim idea as to how much energy would be involved. It would take more than all the electric power generated in the United States."

"I'm not sure I believe all that," said Electra thoughtfully, "but if they can't blow it away how *are* they going to get rid of it? Don't they have any way of controlling industry to cut down the smoke output as they did in Pittsburgh and other cities?"

"Sure they do," I said, "and the industries in Los Angeles have done an outstanding job in doing their part to eliminate smog. However, their part is only a small portion of the over-all picture. Everybody in the whole Los Angeles area is guilty of contributing to the formation of smog. Every time someone starts a fire in the barbecue pit, burns trash in an incinerator or takes the family car out to pick up the kids at school, he is contributing to some of the elements that scientists now know produce smog. You probably won't believe this, either, but the 2,000,000 automobiles in Los Angeles pump into the air 1,200 tons of unburned gasoline plus 300 tons of nitrogen oxide every day and these two products are big smog producers.

"You make it sound hopeless," mused Electra. "You never are going to make barbecuing unpopular with the common people and it's ridiculous to think that you could re-educate this generation into the art of walking. And if what you say is true it seems to me that other places are going to be bothered with smog, too, even if they aren't already. I have been a little suspicious of that haze over San Francisco at times myself."

"You are wrong on the first count, it's not hopeless at all," I said bravely, because I seldom take direct issue with Electra's ideas, "but you are dead right on the second. Factors that might create smog are present everywhere that people live and work together. Los Angeles is merely the first place that such conditions have concentrated to the point where community-wide action has to be taken. There probably will be a lot of cities elsewhere that some day will thank LA for its pioneering effort in that direction.

"A lot of money has been spent and is going to have to be spent just to find out all the causes of smog. Already, however, the scientists know that it's the products of combustion, both solid particles and gaseous products, that are the culprits. The general idea on smog prevention seems to be: if you can't burn it cleanly, don't burn it at all. You can pass ordinances to prevent people from using incinerators but you can't legislate the efficiency of a gasoline engine or a gas-fired furnace. That takes research—and after successful research the whole long chain of expensive changes in the design of new and better machines and the modification of existing units.

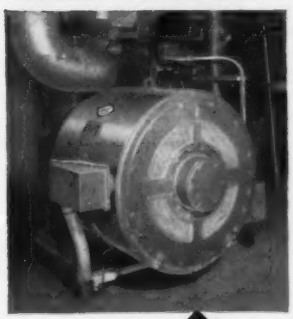
"Getting rid of the smog is going to be a costly and tedious process but, as this speaker said, it cost three-quarters of a billion dollars to bring an adequate supply of pure water into southern California. Maybe the people there eventually will be willing to pay as much for pure air."

"That was a very nice dissertation," commented Electra, "but it's just about one week too late to do me any good. The next time you take me some place I wish you would please remember to give me a briefing so that I might have an intelligent conversational gambit or two. Now stop that mumbling and tell me who the blonde was that was making such a spectacle out of herself at the cocktail party Thursday night."

Furnishing Major Auxiliary Drive Power at Indiana-Kentucky Electric Corporation's Clifty Creek Plant

Three of eighteen Allis-Chalmers 2500-hp, 4000-volt, 3580-rpm two-pole motors driving boiler feed pumps at Clifty Creek.

Rooftop installation of Allis-Chalmers 1500-hp, 4000-volt, 1185-rpm weather-protected motors. This is one of twelve Allis-Chalmers motors giving dependable service driving forced-draft fans at this modern new plant.



Allis-Chalmers 250-hp flange-mounted motor driving plant air compressor. This unusually economical mounting method for such a large motor can be attributed to Allis-Chalmers experience in motor applications throughout the electric power industry.

A wide variety of Allis-Chalmers motors furnish most of the major auxiliary drive power at Clifty Creek Plant near Madison, Indiana. Allis-Chalmers motors are driving plant air compressors, coal handling equipment, forced-draft fans, boiler feed pumps and many other pumps.

The Allis-Chalmers motors at this Indiana-Kentucky Electric Corporation installation are just a few of the complete line of motors Allis-Chalmers builds for power plant service. Contact the Allis-Chalmers district office in your area, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, for complete information.

A-4956

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all-silicone-rubber motor insulation. Available only on Allis-Chalmers motors — in many of the larger sizes. Ask your A-C representative for the facts about this revolutionary new insulation system.

Silco-Flex is an Allis-Chalmers trademark.

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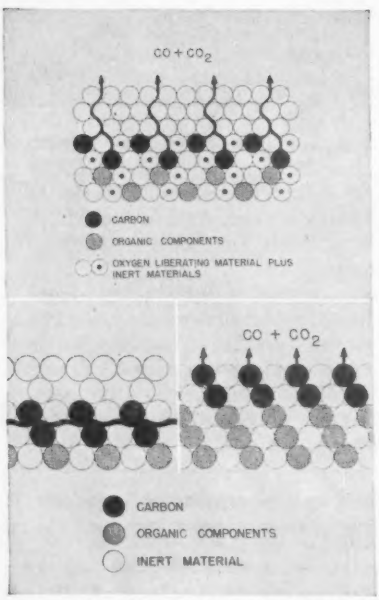
ALLIS-CHALMERS

IMPORTANT PROGRESS towards high-voltage molded instrument transformers has been made, according to J. A. Yunker, Manager—Instrument Transformer Sales, by development of a non-tracking butyl compound. Above, he explains to E. E. Parker (right), General Manager—Instrument Department, why elimination of tracking or flash-over damage results in safer equipment that requires less maintenance.

New discovery prevents "arc tracking" on organic insulating materials



DRAMATIC ELIMINATION OF CARBON TRACK is shown by molecular comparison. Above, new internal oxidation mechanism that prevents tracking in organic insulation. Lower right, initial surface oxidation that produces formation of carbonized track, causing creepage failure of organic material (lower left).

A major advance in the search for better insulating materials has been made with the discovery of a chemical mechanism that prevents "arc tracking" on organic materials.

Developed at General Electric's Measurements Laboratory in Lynn, Massachusetts, the new mechanism will have its first application in a reinforced butyl rubber compound, HY-BUTE/60, as insulation, support, and casing for high-voltage instrument transformers. Under extremely destructive tests, HY-BUTE/60 has proved far superior to other insulating materials in withstanding severe electrical discharges.

THE NEW COMPOUND enables butyl-molded instrument transformers to be used for voltages of 15 kv and above by preventing the formation of carbon tracks on insulation, even under severe arcing conditions. As a result, oil-filled tanks, porcelain bushings, and gaskets can be eliminated, and higher-voltage instrument transformers can be built that are lighter, smaller, less susceptible to mechanical damage, and virtually maintenance-free.

THE CHEMICAL MECHANISM which makes HY-BUTE/60 non-tracking can be used with many other organic materials as well. Utility men will recognize that this discovery makes possible a vast number of potential applications in other system components.

SINCE PIONEERING IN 1949 the use of butyl for molded instrument transformers, General Electric engineers have directed research to extending the use of molding compounds to higher voltage levels. This research and engineering skill have now made a significant contribution to the improvement of system continuity for utilities. Further information on HY-BUTE/60 and elimination of carbon tracking on organic insulation can be obtained by writing for publication GET-2514 to the General Electric Co., Schenectady 5, N. Y. 301-286

MORE POWER TO AMERICA

GENERAL ELECTRIC

ELECTRICAL WEST

VOL. 116, NO. 2
FEBRUARY 1956

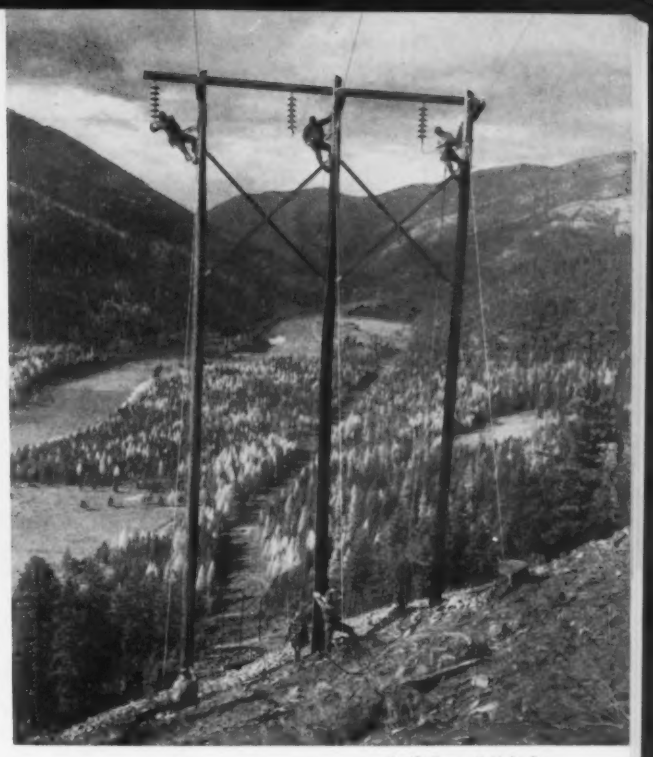
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

GROWTH

GROWTH

GROWTH

With 1956, the West will continue an accelerated expansion program in generating capacity that will add 11,592,200 kw in the next five years



Pacific Power & Light Co.

Generating projects, authorized, started, and awaiting FPC license will increase the West's power production facilities 56% by 1960. This growth figure, measured in the 11,500,000 kw it represents, becomes truly impressive when viewed alongside the record of the last decade. In the 10 postwar years, when the economy of the West as a whole, and the electrical industry particularly, was experiencing an unprecedented expansion, generating capacity increases totaled almost exactly the same amount as is programmed for the next half decade.

Power system budgets for 1956 total a record-breaking $831,218,000. This figure reflects a break in the federal power domination over the river sheds in the Pacific Northwest. During 1955 both private and nonfederal power agencies received FPC approval in developing new sites in that area. Starts have been made on three projects in the million-kilowatt class by the Pacific Northwest Power Co. (Pleasant Valley and Mountain Sheep on the middle Snake), by Grant PUD (Priest Rapids on the Columbia) and by Idaho Power Co. (Hells Canyon on the Snake). In the half-million kilowatt category, Washington Water Power Co. has started Noxon Rapids on the Clark Fork; Chelan PUD will build Rocky Reach on the Columbia and Pacific Power & Light will develop the upper Lewis River.

In steam generation, 1955 brought the West's first order for two 200-mw turbogenerators (placed by Southern California Edison) and the ground breaking for the Los Angeles Department of Water & Power's 1,200,000-kw Scattergood steam station.

Sustained growth characterized developments during the past year. In the electrical industry, the reliable barometer of energy produced climbed 10.7%, to over 100 billion kwh. Capacity additions increased the generating capability by 1,958,350 kw, for a grand total of over 20,000,000 kw. Customers increased by 3.9% to crowd the 8,000,000 mark and new housing starts set a record of 320,000. Engineering construction awards in the West jumped 22.7% to $2.67 billion. To meet this demand for expansion on all fronts of the economy, the utilities of the West spent $641,593,000 for system enlargement during the year.

That the tempo of this expansion is still accelerating is best indicated by studying the figures on major items in the construction programs for 1955 and 1956 shown below. Significant increases in transmission and distribution facilities will be noted. Although scheduled additions to generating capacity for this year are less than last, large expenditures are earmarked in the budget for preliminary work on the very large projects mentioned above which go into service two or three years hence. Out of the $831,218,000 to be spent this year, nonfederal agencies will account for over 87%.

Despite a prediction of a slowdown in housing starts for the nation as a whole, builders expect the West to maintain its present rate of over 300,000 new dwelling units this year. Commercial and industrial construction shows no signs of slackening off, either visually or statistically. Even a modest retreat from 1955's record high would still keep the over-all construction program in the 11 Western states at well above a $5 billion total figure.

The statistics reported on the following pages support those who view the future of this area with growing optimism. All of the ingredients for growth and prosperity are present. For the electrical industry, the vigor of the over-all economy plus the size of the projected expenditures for system expansions indicate that 1956 could be a record breaker in all categories.

Utility Construction Programs*

	1955	1956
Hydro additions (kw)	1,009,100	689,200
Fuel additions (kw)	949,250	846,250
Transmission lines (miles)	2,241	2,866
Transmission substations (kva)	3,457,637	6,231,502
Distribution (miles)	6,702	6,990
Distribution substations (kva)	1,993,495	2,312,173

* From agencies representing 93% total customers.

The West's Growth

Table I—Comparison of National to Western Operations for 1954 and 1955

	11 Western States		United States		Per Cent West to U.S.	
	1954	1955	1954	1955	1954	1955
Energy generated (thousands of kwh)	92,876,449	102,099,801	471,686,000	546,838,000	19.6	18.7
Energy generated in hydro plants (thousands of kwh)	64,875,924	64,877,786	107,068,000	112,106,000	60.5	57.7
Energy generated in fuel plants (thousands of kwh)	27,990,525	37,222,015	364,618,000	434,734,000	7.7	8.5
Percentage of hydro to total generated	69.6	63.6	22.7	20.4	...	...
Installed generator capacity (kw)	18,617,609	20,486,758	102,592,000	112,133,782	18.2	18.3
Installed hydro generator capacity (kw)	11,294,336	12,362,186	23,211,000	24,745,550	48.5	50.0
Installed fuel generator capacity (kw)	6,464,721	8,124,572	79,381,000	87,388,232	8.2	9.3
Revenue from energy sales (thousands of dollars)	1,030,754	1,130,000	7,277,267	8,021,000	14.1	14.1

Sources: Generation and capacity, Federal Power Commission; revenue, Edison Electric Institute. 1955 estimate on 11 months' operations.

Table II—Ten-Year Generation Record for Western Public Utilities (in thousands of kwh)

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955*
Arizona	2,823,650	2,769,495	3,282,118	3,434,189	3,489,309	3,960,041	6,344,000	5,438,401	5,406,513	5,502,917
California	17,313,659	19,441,429	20,286,893	22,112,191	24,835,775	29,375,692	29,251,000	35,062,488	37,749,350	42,100,971
Colorado	1,168,151	1,375,653	1,592,067	1,630,959	1,855,610	2,263,192	2,316,000	2,731,390	3,518,338	3,684,679
Idaho	1,334,914	1,507,474	1,622,107	1,840,226	2,537,648	2,915,242	3,729,000	3,850,099	3,925,012	3,859,552
Montana	2,465,805	2,764,383	2,869,825	2,915,361	3,136,251	3,303,612	3,780,000	3,727,297	4,272,200	4,774,685
Nevada	2,488,076	2,908,189	3,607,239	3,591,363	3,210,425	2,547,243	3,568,000	2,127,373	1,978,626	1,488,532
New Mexico	604,992	753,897	845,696	910,885	1,014,453	1,171,878	1,357,000	1,545,681	1,603,446	1,736,798
Oregon	4,148,566	5,456,577	5,433,228	5,291,441	5,544,548	5,975,489	6,661,000	6,891,347	9,046,223	12,225,856
Utah	457,169	562,198	600,208	614,598	658,571	824,318	1,113,000	1,571,054	1,731,901	2,339,314
Washington	9,038,842	11,230,994	13,881,239	15,079,298	17,370,986	19,914,385	19,463,000	22,933,252	23,019,777	23,675,824
Wyoming	315,898	325,684	388,656	506,207	594,812	638,386	865,000	835,737	606,133	710,593

*FPC reports 12 months ending November 30, 1955.

Table III—Type and Capacity of Generators, November 1955

	Number of Utilities	Number of Plants	Total Capacity Kilowatts	Generator Capacity in Kilowatts of Plants Operated by — Water Power		Steam Power		Internal Combustion Engines	
				Number	Capacity	Number	Capacity	Number	Capacity
Arizona	14	43	1,627,390	12	980,040	11	577,950	20	69,400
California	20	166	8,407,110	129	3,104,007	30	5,258,993	7	44,110
Colorado	37	77	947,528	28	247,517	23	662,398	26	37,613
Idaho	12	47	781,335	42	777,020	0	0	5	4,315
Montana	8	25	925,152	18	850,910	4	71,800	3	2,442
Nevada	7	16	597,088	9	586,180	0	0	7	10,908
New Mexico	15	32	457,453	4	24,910	13	393,110	15	39,433
Oregon	14	72	2,046,306	54	1,842,019	12	198,710	6	5,577
Utah	26	85	521,596	58	93,315	8	397,500	19	30,781
Washington	19	55	3,939,727	40	3,712,886	8	221,820	7	5,021
Wyoming	19	51	236,073	19	143,382	12	79,320	20	13,371
11 Western States	191	669	20,486,758	413	12,362,186	121	7,861,601	135	262,971
United States	1,431	3,625	112,133,782	1,392	24,745,550	1,051	85,031,495	1,182	2,356,737

Source: Federal Power Commission.

Table IV—Power Company, Federal, Municipal and Power District Systems Construction Expenditures—11 Western States Compared with U. S.

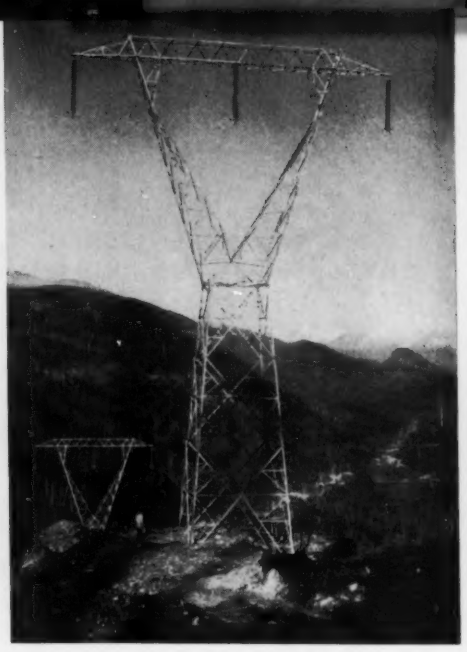
Year	U. S.	11 Western States	Per Cent West to U. S.	Year	U. S.	11 Western States	Per Cent West to U. S.
1947	1,372,145,000	254,332,455	18.5	1952	2,901,250,000	491,315,000	16.9
1948	2,078,088,000	375,000,000	18.0	1953	3,187,489,000	490,664,000	15.4
1949	2,517,614,000	422,000,000	16.8	1954	3,997,669,000	713,133,240	17.8
1950	2,347,171,000	362,519,000	15.4	1955	3,621,513,000	646,736,000	17.9
1951	2,443,324,000	425,195,556	17.4	1956	3,906,000,000	831,218,000*	21.3

* Total budget, all agencies, based on reports representing 93% of total meters served in the 11 Western States.

Record at a Glance

- Energy production in the 11 Western states during 1955 jumped to 102 billion kwh—up 10.7%.
- Installed capacity hit 20,486,758 kw of which fuel-fired plants account for 39.6%. Increase during 12-month period totaled 1,817,000 kw.
- Power system budgets for 1956 hit an all-time high of $831,218,000—21.2% of estimated U. S. expenditures for utility expansion.
- Western utilities now serve 7,918,000 customers (a gain of 3.9% during 1955), and collect over $1.1 billion in annual revenue. Growth rate is at 300,000 new customers per year.
- Future generation in the West to skyrocket! Scheduled additions: 1956—1,535,450 kw; 1957—1,661,500 kw; 1958—3,073,150 kw; 1959—2,961,050 kw; and 1960—2,361,100 kw.
- Engineering construction for the West jumped 22.7% to $2,677,106,000 for 1955. Housing starts totaled 320,000 dwelling units.
- Dealers sold $109 worth of appliances to the average household in 1955. With an estimated 6,622,137 domestic customers in the region, average home had an investment of nearly $1,000 in appliances, radio and TV in terms of present-day replacement values.
- Average use by residential and farm customers rose to 3,467 kwh, a gain for the region of 164 kwh. However, 28 utilities reported average power consumption of more than 6,000 kwh and four were above the 10,000 mark.

Morro Bay plant of Pacific Gas and Electric Co. will house two 165,000-kw units



West's first 345-kv line is built by B. C. Electric

Utility Construction Tempo

Budget hits record high of $831,218,000—up 27%

Rugged terrain of Navajo Indian Reservation made a new experience in line building for Arizona Public Service Co. crews. The 85-mile line will serve a uranium processing mill

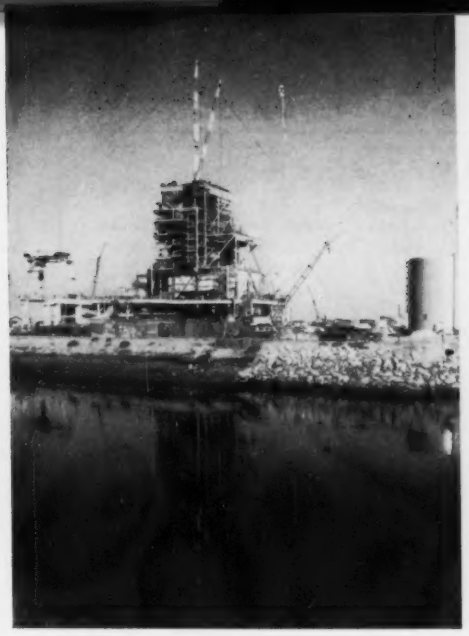
With a record-setting total budget of $831,218,000* for all power agencies of the Far West, the tempo of capital expenditure is up 27% over expenditures of $641,593,000† in 1955. For nonfederal agencies alone, the 1956 increase will be an amazing 38%. Total budget for these agencies is $726,919,000 as compared with $527,653,000 expended in 1955. Allocation for federal agencies—Army Engineers, Bureau of Reclamation and Bonneville Power Administration—is $104,299,000 as compared with $113,940,000 for 1955.

Energy Production in the 11 Western states for 1955 was 102,099,801,000 kwh. This compares with 92,876,449,000 kwh for 1954, an increase of 10%. Generation for the West was 21.8% of the U. S. total.

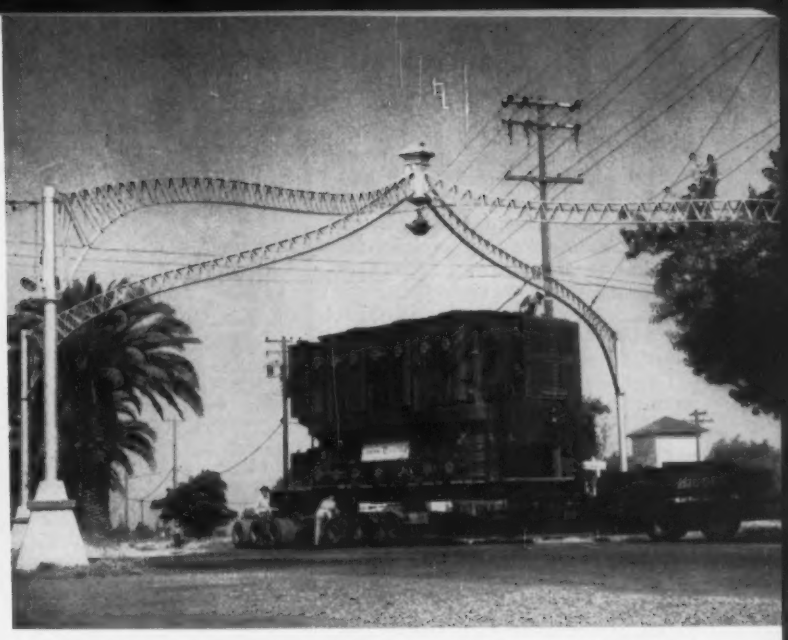
New Generation planned for this year is 1,535,450 kw, of which 846,250 kw will be steam and 689,200 kw hydro. This compares with 949,250 kw steam and 1,009,100 kw hydro for a total of 1,958,350 kw brought in the past year.

* Total budget, all agencies, based on reports representing 93% of total meters served in 11 Western states.

† Computed on same basis as budget figure for 1956.



Edison's new 330,000-kw Alamitos steam plant



Sacramento MUD installs two 185,000-kva, three-phase transformers at Elverta sub

Will Be Stepped Up in 1956

Combined noncoincidental peak was up 13.2% for 1955

With the continually increasing size of prime movers and generators and with several hydro projects in the million-kilowatt category under construction, the total of yearly new generating capacity completed necessarily becomes cyclic. For instance, for 1956 there is scheduled 1,535,450 kw; for 1957, 1,-661,500; yet for 1958 there is planned 3,073,150 kw; and for 1959, 2,961,050 kw.

Noncoincidental Annual Peak for major systems in the 11 Western states in 1955 was 21,273,000 kw as compared with 18,797,000 kw for 1954, an increase of 2,476,000 kw or 13.2%. This compares with an increase of 10.3% for the year before. It is significant to note that the 2,476,000-kw increase for 1955 was slightly in excess of the annual peak of 2,284,900 kw for the Southern California Edison system. This means that, in the aggregate, we must build a Southern California Edison Co. system each year here in the West.

New Transmission planned for 1956 totals 2,866 miles, of which 913 miles will be built by federal agencies. Total for 1955 was 2,241 miles, of which 598 miles were federal. These figures show that construction this year will exceed the year passed by 625 miles or 27.8%.

Distribution Line Mileage planned for 1956 is 6,990, up 4.3% from the 6,702 miles built in 1955.

Transmission Substation Capacity planned for 1956 is 6,231,502 kw—an amazing 80% increase over the 3,457,-637 kw added in 1955.

Distribution Substation Capacity planned for this year is 2,312,173 kw. This compares with 1,993,495 kw added in 1955.

Major Indices given above thus indicate an increasing tempo in utility construction for the year to come.

Statements by federal and nonfederal agencies to be found in the pages that follow review major construction completed in 1955 and that planned for 1956. These reports will be found most enlightening.

Federal

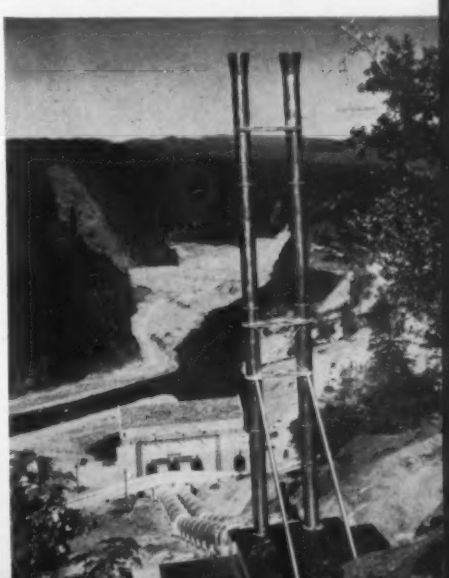
Army Engineers

The many large multipurpose power projects now under construction in the Pacific Northwest by the U. S. Army Engineers will be found listed under the states in which they are located.

Bonneville

Report of the Bonneville Power Administration is on p 101.

PG and E completes 95,000-kw Pit No. 4



REA

REA approved more than $46,000,000 in rural electrification loans to borrowers in Western states during 1955. This is about three times the amount loaned to area borrowers during the preceding year and brings the cumulative total of electric loans in the 11 Western states to nearly $375,000,000.

Last year's loans were distributed among the states as follows: Arizona, $961,000; California, $5,562,000; Colorado, $24,335,000; Idaho, 1,739,000; Montana, $2,522,000; New Mexico, $2,250,000; Oregon, $1,451,000; Utah, $2,950,000; Washington, $805,000; Wyoming, $3,821,000. No loan was approved in Nevada during 1955.

These loans will enable Western REA borrowers to serve an estimated 35,000 new consumers and add approximately 7,000 miles of line.

In December 1955, REA electric borrowers were serving about 309,000 consumers in the Western area over nearly 128,000 miles of line. A year earlier, in December 1954, about 300,000 consumers were receiving electric service over some 123,000 miles of line. These figures show an over-all increase during 1955 in the number of consumers served by REA-financed systems in the Western area. However, because of a change in the basis for determining consumers served, some individual states show an apparent loss in the number of consumers.

In the Western areas, as on REA-financed systems throughout the country, the present emphasis is on system improvement to meet the continually growing demand of rural areas for power. Nationally, power consumption on REA-financed lines is doubling every five years. To help meet power shortages, which have developed in some rural areas, REA is working with its borrowers and the electric industry in an effort to get more adequate supplies. It is also approving generation and transmission loans when they are needed and feasible. For example, REA approved more than $13,655,000 in loans for new generating and transmission facilities in power-short areas of Colorado during 1955.

REA estimates, based on preliminary 1954 Census of Agriculture figures on total number of farms, show that about 93% of farms in the 11 states in the Western area had electric service on July 1, 1955. The percentage of electrified farms in the individual states is as follows: Arizona, 86.6%; California, 95.9%; Colorado, 87.0%; Idaho, 96.9%; Montana, 84.7%; Nevada, 72.0%; New Mexico, 80.5%; Oregon, 97.2%; Utah, 96.9%; Washington, 98.3%; Wyoming, 84.6%. These percentages are generally lower

Status of Western REA-Financed Systems

Borrower	Cumulative Construction Loans 12-31-55	1955 Construction Loans	Miles Energized 12-1-55	Consumers Served 12-1-55
ARIZONA	**$21,317,369**	**$ 961,000**	**4,469**	**13,102**
Navopache Electric Co-op., Lakeside	3,248,000	...	692	2,760
Sulphur Springs Valley Electric Co-op., Willcox	6,792,828	815,000	1,458†	4,506†
Littlefield Electric Co-op., Littlefield	20,000	...	14†	22†
Graham County Electric Co-op., Pima	3,032,318	...	619	2,351
Trico Electric Co-op., Tucson	4,348,368	...	666	967
Verde Electric Co-op., Cottonwood	558,569	...	214†	425†
Mohave Electric Co-op., Kingman	975,000	146,000	278	474
Duncan Valley Electric Co-op., Duncan	750,000	...	255	816
Wellton-Mohawk Irrig. & Drainage Dist., Wellton	1,350,000	...	40†	250†
Stonewall Electric Co., Tucson	100,000‡	...	116†	200†
San Carlos Irrig. & Drainage Dist., Coolidge	142,286‡	...	117†	331†
CALIFORNIA	**$21,023,178**	**$ 5,562,000**	**3,237**	**35,988**
Surprise Valley Electrification Corp., Alturas	2,391,500	...	948	1,877
Plumas-Sierra Rural Elec. Co-op., Portola	1,492,000	...	553	1,182
Mountain Empire Elec. Co-op., Campo	822,000	...	223	1,076
Sacramento MUD*, Sacramento	14,356,000	4,962,000	567†	27,454†
Desert Eectric Co-op., Twentynine Palms	600,000	600,000	...**	...**
Anza Electric Co-op., Anza	550,000	...	143†	219†
Mesa Electric Co-op., Phelan	67,829‡	...	...‡	...‡
Imperial Irrigation Dist.,* Imperial	700,000‡	...	800†	4,100†
Klamath River Electric Co-op., Hornbrook	43,849‡	...	3†	80†
COLORADO	**$89,926,741**	**$24,335,000**	**29,987**	**69,817**
Grand Valley Rural Power Lines, Grand Junction	1,729,000	...	711	3,525
San Luis Valley Rural Elec. Co-op., Monte Vista	3,749,000	465,000	1,260	3,080
Morgan County Rural Elec. Assn., Fort Morgan	5,793,000	1,897,000	2,025†	3,697†
Intermountain Rural Elec. Assn., Littleton	6,354,500	1,035,000	2,136	6,505
Southeast Colorado Power Assn., La Junta	7,975,234	300,000	4,364	5,435
Gunnison County Elec. Assn., Crested Butte	789,166	...	277	481
Delta Montrose Rural Power Lines Assn., Delta	1,742,000	448,000	769	2,120
Union Rural Elec. Assn., Brighton	2,897,000	660,000	994	3,420
San Isabel Elec. Assn., Pueblo	4,794,741	2,280,000	1,645	4,748
San Miguel Power Assn., Nucla	2,656,000	1,265,000	506	1,734
Highline Elec. Assn., Holyoke	4,186,511	...	2,634	4,175
Poudre Valley Rural Elec. Assn., Fort Collins	2,483,000	...	1,260	3,473
La Plata Elec. Assn., Durango	1,809,000	...	683	2,025
Empire Elec. Assn., Cortez	3,790,448	1,390,000	808	4,161
Holy Cross Elec. Assn., Glenwood Springs	1,560,000	...	538	2,081
Sangre De Cristo Elec. Assn., Salida	1,222,000	...	458	1,084
Yampa Valley Elec. Assn., Steamboat Springs	4,861,000	...	1,146	4,084
Mountain View Elec. Assn., Limon	5,790,500	940,000	2,731	4,250
Y-W Elec. Assn., Akron	3,833,747	...	2,086	3,431
K. C. Elec. Assn., Hugo	4,295,000	...	1,958	3,297
White River Elec. Assn., Meeker	1,490,894	...	348†	948†
Mountain Parks Elec., Granby	2,470,000	...	650	2,063
Colorado-Ute Elec. Assn., Montrose	10,155,000	10,155,000	...**§	...§
Arkansas Valley G & T, Pueblo	3,500,000	3,500,000	...§‖	...§
IDAHO	**$17,044,795**	**$ 1,739,000**	**6,328**	**14,198**
Northern Lights Inc., Sandpoint	4,678,750	1,739,000	1,158	3,187
Clearwater Power Co., Lewiston	3,857,000	...	1,941	4,291
Kootenai Rural Elec. Assn., Coeur d'Alene	1,211,000	...	536	1,428
Idaho County L & P Co-op. Assn., Grangeville	1,153,500	...	674	1,198
Raft River Rural Elec. Co-op., Malta	1,412,500	...	466	539
Fall River Rural Elec. Co-op., Ashton	1,435,000	...	582†	1,388†
Lost River Elec. Co-op., Mackay	1,327,000	...	259	883
Prairie Power Co-op., Fairfield	424,000	...	234	213
Salmon River Elec Co-op., Challis	1,350,000	...	313	651
Long Valley Power Co-op., Donnelly	196,045‡	...	165†	420†
MONTANA	**$49,459,034**	**$ 2,522,000**	**26,332**	**39,436**
Ravalli County Elec. Co-op., Corvallis	871,700	...	383	961
Sun River Elec. Co-op., Fairfield	2,419,500	...	1,849	2,344
Lower Yellowstone Valley Elec. Co-op., Sidney	1,861,600	...	1,078	1,537
Yellowstone Valley Elec. Co-op., Huntley	2,025,498	350,000	978	2,428
Vigilante Elec. Co-op., Dillon	2,673,000	...	1,330	1,944
Missoula Elec. Co-op., Missoula	1,912,000	327,000	580	1,135
Flathead Elec. Co-op., Kalispell	2,745,000	...	739†	2,064†
Fergus Elec. Co-op., Lewistown	3,271,354	180,000	2,337	2,672
Park Elec. Co-op., Livingston	1,545,000	295,000	686	1,158
Mid-Yellowstone Elec. Co-op., Hysham	937,000	192,000	461	754
Beartooth Elec. Co-op., Red Lodge	1,235,983	...	1,000	1,769
Big Horn County Elec. Co-op., Lodge Grass	1,767,000	180,000	719	1,349
Big Flat Elec. Co-op., Malta	1,599,000	...	977	892
Sheridan County Elec. Co-op., Medicine Lake	2,715,000	...	1,927†	2,047†
Northern Elec. Co-op., Opheim	1,918,000	...	1,017	1,053
Valley County Elec. Co-op., Glasgow	935,000	...	619	799
McCone County Elec. Co-op., Circle	4,152,399	400,000	2,369	2,691
Goldenwest Elec. Co-op., Wibaux	1,139,000	...	745	739
Glacier County Elec. Co-op., Cut Bank	2,886,000	...	852	3,132
Marias River Elec. Co-op., Shelby	1,911,000	...	988	2,571
Hill County Elec. Co-op., Havre	3,335,000	...	2,369	1,802
Tongue River Elec. Co-op., Ashland	2,043,000	...	954†	1,254†
Southeast Elec. Co-op., Ekalaka	1,701,000	68,000	1,034	1,063
Lincoln Elec. Co-op., Eureka	1,640,000	530,000	292	1,088
Elmo Elec. Co-op. Assn., Proctor	220,000	...	49†	190†
NEVADA	**$ 353,540**	...	**165**	**765**
Alamo Power Dist. No. 3*, Alamo	99,000	...	36	90
Overton Power Dist. No. 5*, Overton	254,540	...	129†	675†

Borrower	Cumulative Construction Loans 12-31-55	1955 Construction Loans	Miles Energized 12-1-55	Consumers Served 12-1-55
NEW MEXICO	**$64,243,499**	**$ 2,250,000**	**19,105**	**44,721**
Central Valley Elec. Co-op., Artesia	4,048,000	247,000	1,171	3,108
Roosevelt County Elec. Co-op., Portales	3,144,000	382,000	1,437	2,180
Farmers' Elec. Co-op., Clovis	4,235,000	367,000	2,500	4,044
Kit Carson Elec. Co-op., Taos	2,572,215	...	734	4,726
Otero County Elec. Co-op., Cloudcroft	3,382,183	654,000	1,068	2,622
Mora-San Miguel Elec. Co-op., Mora	1,483,000	...	730	1,969
Northern Rio Arriba Elec. Co-op., Chama	908,800	...	276	1,087
Sierra Elec. Co-op., Truth or Consequences	598,000	...	257	514
Plains Elec. (Generation and Transmission) Co-op., Albuquerque	9,045,000	...	181§	...§
Springer Elec. Co-op., Springer	3,478,000	381,000	1,309	2,220
Socorro Elec. Co-op., Socorro	3,576,331	...	1,307	3,024
Central New Mexico Elec. Co-op., Mountainair	4,403,500	...	2,306	2,999
Continental Divide Elec. Co-op., Grants	3,817,069	219,000	726	3,109
Lea County Elec. Co-op., Lovington	10,408,000	...	1,859	5,340
Columbus Elec. Co-op., Columbus	3,715,000	...	1,005	919
Southwestern Elec. Co-op., Clayton	1,410,000	...	1,222	832
Jemez Mountains Elec. Co-op., Espanola	3,884,903	...	898	5,539
Stonewall Elec. Co., Albuquerque	134,498‡	...	119†	489†
OREGON	**$35,120,958**	**$ 1,451,000**	**9,809**	**31,571**
Blachly-Lane County Co-op. Elec. Assn., Eugene	1,302,000	...	300	1,211
Benton-Lincoln Elec. Co-op., Corvallis	5,540,000	...	1,446	4,837
Umatilla Elec. Co-op. Assn., Hermiston	1,443,000	...	477	1,815
Douglas Elec. Co-op., Roseburg	3,100,674	150,000	859	3,516
Lane County Elec. Co-op., Eugene	3,342,426	...	751	5,087
Coos-Curry Elec. Co-op., Coquille	4,192,604	...	745	4,830
Sandy Elec. Co-op., Sandy	1,064,000	...	201	899
Tillamook PUD*, Tillamook	425,000	...	75†	404†
Central Elec. Co-op., Redmond	2,051,000	275,000	753	1,685
Wasco Elec. Co-op., The Dalles	2,590,000	250,000	1,156	1,541
Columbia Basin Elec. Co-op., Heppner	2,290,000	625,000	818	651
West Oregon Elec. Co-op., Vernonia	2,069,000	...	468	2,147
Eastern Oregon Elec. Co-op., Pendleton	795,000	...	236	592
Columbia Power Co-op. Assn., Monument	2,385,000	151,000	620	946
Midstate Elec. Co-op., Lapine	2,040,000	...	535	698
Malheur Co-op. Assn., Vale	463,670‡	...	365†	621†
Jordan Valley Elec. Co-op., Jordan Valley	27,584‡	...	4†	91†
UTAH	**$ 8,840,907**	**$ 2,950,000**	**1,835**	**4,547**
GarKane Power Assn., Richfield	2,829,500	1,200,000	551	1,612
Moon Lake Elec. Assn., Altamont	5,577,000	1,750,000	1,095†	2,529†
Escalante Valley Elec. Assn., Beryl	322,800	...	109†	255†
Flowell Elec. Assn., Fillmore	34,000	...	37†	74†
Dixie Rural Elec. Assn., St. George	63,000	...	30†	32†
Beaver Valley Elec. Assn., Beaver City	14,607‡	...	13†	45†
WASHINGTON	**$36,565,710**	**$ 805,000**	**13,502**	**34,638**
Benton Rural Elec. Assn., Prosser	3,894,500	...	1,119	3,469
Orcas P & L Co., Eastsound	2,057,600	...	323	1,493
Mutual P & L Assn., North Bend	146,919	...	38	154
PUD No. 1 of Klickitat County*, Goldendale	3,150,000	...	906†	2,729†
Inland P & L Co., Spokane	5,015,710	...	3,575	7,365
Columbia County Rural Elec. Assn., Dayton	1,637,000	...	826	1,078
Quinault Light Co., Quinault	763,000	...	35	258
PUD No. 1 of Kittitas County*, Ellensburg	520,500	...	239	535
Okanogan County Elec. Co-op., Winthrop	225,000	...	137	488
Pend Oreille Elec. Co-op., Newport	1,511,000	...	...¶	...¶
Big Bend Elec. Co-op., Ritzville	4,152,000	745,000	1,465†	1,883†
Lincoln Elec. Co-op., Davenport	1,817,000	...	1,171	1,087
Nespelem Valley Elec. Co-op., Nespelem	646,000	...	238	496
Ferry County PUD No. 1*, Republic	2,440,000	...	527	1,129
PUD No. 1 of Douglas County*, Bridgeport	4,197,000	...	892	4,890
Mason County PUD No. 1*, Shelton	230,000	60,000	50†	114†
PUD No. 1 of Cowlitz County*, Longview	201,192‡	...	185†	680†
PUD No. 1 of Lewis County*, Chehalis	467,752	...	330†	1,817†
Stevens County Elec. Co-op., Colville	2,243,996‡	...	1,060†	2,280†
Molson-Chesaw Elec. Co-op., Molson	315,000	...	127	158
PUD No. 1 of Clallam County*, Port Angeles	418,214‡	...	75†	930†
PUD No. 2 of Grant County, Ephrata	49,280‡	...	24†	743†
PUD No. 1 of Pend Oreille County*, Newport	213,956‡	...	59†	498†
Chelan County Elec. Co-op., Leavenworth	253,091‡	...	101‡	364‡
WYOMING	**$30,704,217**	**$ 3,821,000**	**13,196**	**20,429**
Riverton Valley Elec. Assn., Riverton	1,575,000	...	998	1,689
Big Horn Rural Elec. Co., Basin	1,845,000	320,000	805	1,589
Wyrulec Co., Lingle	1,859,600	...	1,091†	1,902†
Bridger Valley Elec. Assn., Mountain View	1,397,801	...	430	815
Wheatland Rural Elec. Assn., Wheatland	1,586,000	345,000	965	1,061
Lower Valley P & L Co., Freedom	4,206,006	...	519	2,817
Garland L & P Co., Powell	435,300	...	198	500
Washkie Rural Elec. Co., Worland	316,500	71,000	106	291
Rural Elec. Co., Pine Bluffs	3,064,510	...	2,253	2,958
Hot Springs County Rural Elec. Assn., Thermopolis	2,085,000	845,000	674	636
Carbon P & L, Saratoga	2,072,054	175,000	889	1,495
Niobrara Elec. Assn., Lusk	2,376,000	...	1,434	1,306
Shoshone River Power, Cody	1,365,000	...	318	366
Sheridan-Johnson Rural Elec. Assn., Sheridan	1,485,000	...	759	840
Tri-County Rural Elec. Assn., Sundance	4,956,746	2,065,000	1,592	1,936
Sheridan Suburban Elec. Co., Sheridan	78,700‡	...	165†	228†

—— Not energized
† Estimate
‡ Loan repaid
§ Power-type borrower
|| Data not available
¶ Data included with Inland P & L, Wash.
* Public agency

than the estimates for percentage of electrified farms on July 1, 1954. Under the census definition of a farm, many electrified rural establishments previously considered farms were eliminated from the count. Preliminary figures for the 1954 farm census show that the total number of farms in Western area states was 422,699—a drop of about 9% below the 461,673 reported in the 1950 census.

Tabulations showing status of REA borrowers are on these pages. REA operations are shown on p 96.

Bureau of Reclamation

Reports on status of Western USBR projects will be found listed under the states in which they are located. A table will be found on page 103 showing current and future bureau projects. The comprehensive transmission line construction program of USBR will be found on p 102.

Arizona

Arizona Public Service

Construction expenditures for electrical facilities to be added during 1956 are estimated to cost $8,500,000 as compared with $12,000,000 spent during 1955. In July 1955 the Saguaro power plant's second 100-mw unit was put in service completing this plant construction program. There is no major generating plant addition to be made in 1956. Some diesel generating units are being relocated from Yuma to Douglas in order to provide additional capacity in that area.

Transmission line mileage to be added during 1956 is estimated at approximately 70 miles, compared with 107 miles constructed in 1956. One major extension of transmission facility now under construction is from Flagstaff to Tuba City on the Navajo Indian reservation north and east of Flagstaff. This area is highly mineralized and the Rare Metals Corp. is installing a uranium milling facility at the terminal of the line and, of course, this line extension makes electric service available to a large new area.

Distribution lines to be built will amount to approximately 150 miles. A good portion of these extensions are into areas where land is being brought under cultivation and requires power for irrigation pumping.

The Yuma area is growing rapidly and demand for electrical service has been on the increase, requiring considerable rebuilding of electrical facilities. The major projects under way here are the cutover of transmission

voltage from 33 kv to 69 kv and establishing a loop system. Distribution feeders are likewise being converted from the 2.4/4.1-kv class to the 72.2/12.5-kv class, and, of course, distribution capacitors are being installed. A new major substation of 16,000 kva capacity was constructed. There is a prospect of additional land being brought under cultivation south of Yuma that may require some 2,000 to 3,000 kw of irrigation pumping in the near future.

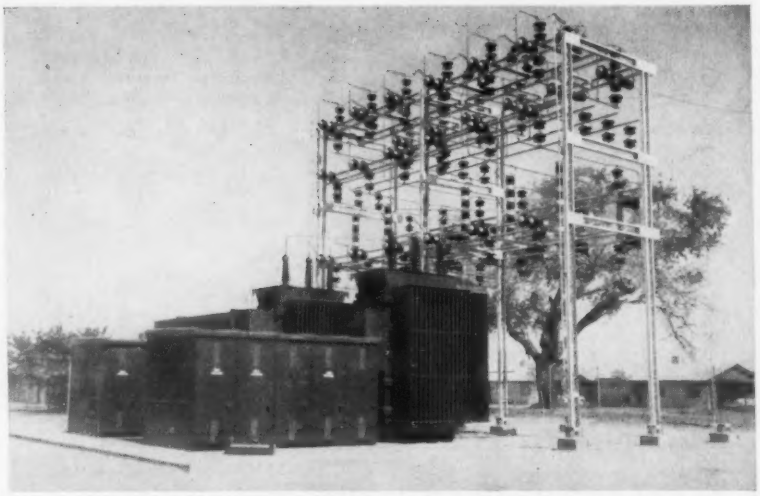
San Manuel Copper Co., approximately 100 miles southeast of Phoenix, is just completing its mining and milling facility installation and getting ready to go into production. Substation facilities were completed to supply between 30,000 and 40,000 kw for this operation.

About four years ago aluminum conductor and cable were brought into use for distribution lines and secondaries in new subdivisions. All new installations are now being made in this manner. The secondaries and service drops are 100% cabled with midspan taps and 90% or more of the installations are three phase because of saturation of air conditioning load.

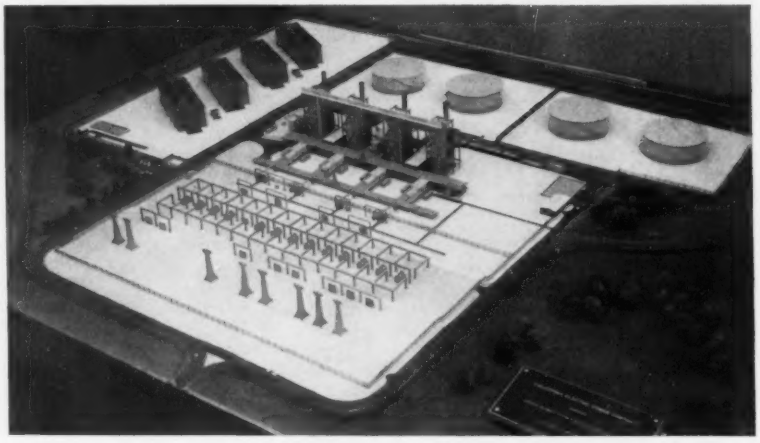
Conversion from 25- to 60-cycle service in the town of Superior with approximately 1,400 customers and the Maricopa area with principally irrigation pumping load terminates all 25-cycle service on the company's system.

There will be further installations of supervisory control equipment including metering, to facilitate operation of the system on a fully automatic and nonattended basis, covering the major substations and switching points on the system. The Irving hydro plant, formerly an attended station, also has been made fully automatic and is now nonattended and plans are under way to convert the Childs hydro generating plant to automatic operation.

During 1955 the company's peak load reached 359 mw, which represents approximately 12½% increase over 1954. Peak load estimate for 1956 is approximately 445 mw.—*George H. Groh, vice-president.*



Ingleside was one of four 69/12-kv substations added by the Salt River Power District



Mock-up of new four-unit San Bernardino steam plant of California Electric Power Co.

Salt River Power District

With actual construction of the first 100,000-kw unit at Agua Fria barely started, the shareholders of the Salt River Project on Oct. 14 approved an additional $10,000,000 bond issue for another 100,000-kw unit at this site. The first of these tandem compound double flow, reheat units is scheduled for completion in April 1957, with the second unit going on the line 12 months later. Natural gas will be the primary fuel with fuel oil stand-by. Make-up water will be supplied from deep wells in the immediate area.

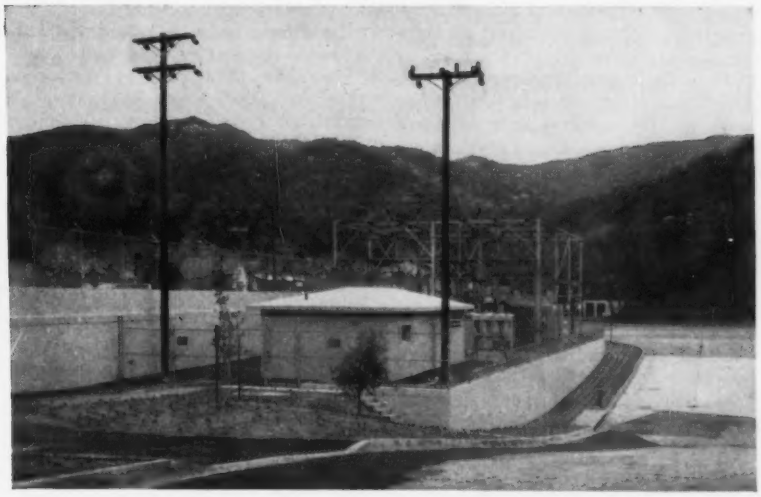
Modernization of the 110-kv transmission system was continued with the conversion of Goldfield and Superior switching stations to supervisory control from the Mesa switching station. Roosevelt Dam power house was modernized with new switchgear control including a tunnel-type duplex switchboard, d-c auxiliary board and control wiring to replace equipment whose origin dated back to the installation of the first unit at this station in 1907. Skin divers were employed at Mormon Flat hydro station to recover a portion of the water wheel that broke loose and fell into the tailrace.

Other construction during the year included the installation of four new 12-kv substations, enlargement of the meter shop and the central warehouse, construction of nine new trouble-shooter and zanjero houses and completion of a division line office and warehouse to replace the facilities destroyed by fire in 1954.

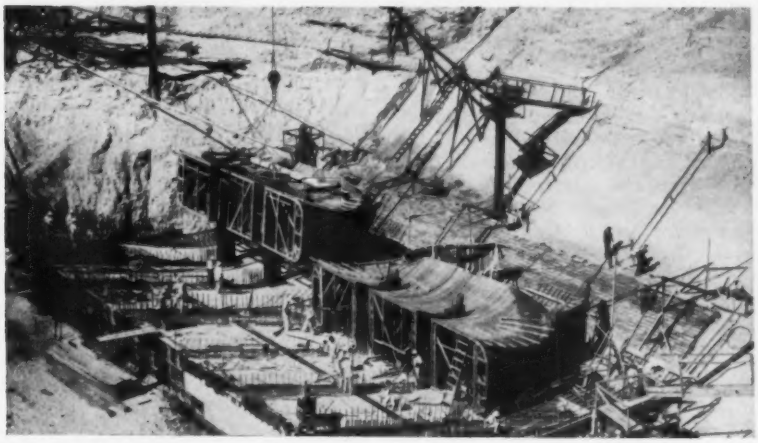
Plans for a new office building have been completed and a 29-acre site has been purchased in the vicinity of the district's Cross Cut steam-electric station. Initial plans call for a two-story building with 75,000 sq ft of floor space to accommodate about 400 employees. Refrigeration, recessed lighting, acoustical tile, direct telephone dialing and a combination cafeteria-auditorium are some of the features planned for the new building. Ample parking space adjoining the building will be provided for employees.—*T. M. Morong, chief engineer.*

Tucson GEL&P

Approximately $1,400,000 were added to property during 1955, consisting principally of distribution lines and substations.



Glorietta substation was an important distribution facility added by Glendale PS Dept.



Pilot Knob 33,000-kw hydro plant of Imperial Irrigation District is scheduled for 1956

Expenditures for 1956 will be approximately $3,000,000 of which about $500,000 will be toward power plant construction and the balance for distribution and related facilities.—*C. E. Hockings, vice-president.*

California

Burbank PS Dept.

There were no major additions to the electric system during 1955. Construction on the new 20,000-kva distributing station was completed. A new 34.5-kv overhead line was constructed, which will connect the new 20,000-kva distributing station to both the Burbank generating plant and to the interconnection with the Department of Water & Power of Los Angeles. It is planned to energize these facilities early in 1956. System peak for the year was 72,000 kw occurring early in December 1955 and corresponds to a 9.2% increase over the previous year. The kilowatt-hours for the year were approximately 366,000,000, which corresponds to a 9.4% increase over 1954.

Plans for 1956

Expenditures in capital improvements were $738,000 for this year and the amount budgeted for 1956 is $1,562,000, which includes planning and engineering for steam-turbo generating unit No. 5. This year 728 new electric meters were set on the system, but the net increase was only 350 meters. Major part of the meters disconnected from the system was the result of the new Golden State Freeway, which will pass through Burbank and is currently under construction.—*A. E. Capon, principal utilities engineer.*

California Electric Power

Construction work carried out at fuel-electric generating plants in 1955 included completion of the installation and placing in operation of 40,000-kw No. 4 generating unit at Highgrove steam plant.

Engineering work is in progress and equipment is on order for installation of the 60,000-kw No. 1 generating unit at the new San Bernardino steam plant. The scheduled date for completion of the first of four generating units is July 1957.

Work completed, or in progress, at hydroelectric generating plants has included replacement of a section of wood-stave flowline at an existing plant; improvements to storage dams, headgates, flumes and related works; rebuilding the indoor bus and switchboard at one plant; replacement of the waterwheel on one unit at an existing plant; construction of new cottages, storerooms and garage facilities as well as alterations at existing buildings; miscellaneous improvements to existing hydraulic and electrical equipment.

The 1955 transmission expenditures are related to the transmission and generating facilities originating at the Highgrove steam plant; conversion of the transmission system to 115-kv operation, including increased transformer capacity in the transmission category; and relocation and rebuilding of approximately 1.6 miles of 115-kv transmission line through a mountain section subject to extreme sleet and storm conditions.

Increase of transmission facilities included the addition of a short section of 115-kv circuit, including terminal facilities at Highgrove steam plant, to provide circuit No. 6 originating at the plant.

Principal transmission items relating to conversion of the system to 115-kv operation included installation of overhead ground wires; revamping or replacement of existing lightning arresters; changing out of transformer capacity at existing substations and installation of new transformers at selected locations. Net increase in transmission substation capacity was 76,000 kva.

Other transmission expenditures included progress on the installation of supervisory control of an existing substation; transfer trip facilities for transmission line relaying; conversion of relaying facilities to high-speed operation; installation of one fixed oscillograph; addition of magnesium anodes at selected line and station locations; routine repoling.

Distribution construction, in addi-

tion to customer extension, has included substation transformer capacity totaling 11,550 kva in new stations; 50,450-kva net increase in existing substation capacity; installation of new and modernized oil circuit breakers; construction of new operating, stores and garage buildings; improvements and additions at existing buildings; addition of regulators and capacitors at selected stations and line locations; cutover of existing primaries to 4-kv or 12-kv operation; reconstructions, reconductoring and repoling on existing lines.

The principal single expenditure in the category of general structures was the purchase of a site in the San Bernardino-Rialto area for the location of a new general office and general service center.

1956 Construction Program

During 1956 the principal single construction expenditure will include progress on the installation of unit No. 1 at the San Bernardino steam plant. The second item in expenditure magnitude will involve starting of construction of the new general office and general service center in the San Bernardino-Rialto area.

At the new San Bernardino steam plant site work will be started on the installation of generating unit No. 1 together with a minimum of common facilities for an ultimate four-unit plant. The first 60,000-kw unit is scheduled for completion by July 1957.

The general office building, a two-floor structure, will be of stone, porcelain enamel and brick construction. The general service center will consist of two single-floor buildings of brick and tilt-up concrete construction. The building comprising the office and service center will be located on two tracts of land totaling approximately 26 acres in area. An adjacent 10-acre tract has been secured to provide for future expansion.

Work at hydro plants will include minor improvements to storage dams and related works; replacement of a section of wood-stave flowline; rewind a generator at an existing plant; replacement of oil circuit breaker equipment; alterations to existing plant buildings; and miscellaneous improvements to existing hydraulic and electrical equipment.

The 1956 transmission expenditures are related to expansion and revamping of the transmission system; improvement and modernization of relaying facilities at substations; and repoling at selected locations on existing lines. Approximately 44 miles of additional transmission line will result from the expansion and revamping work.

In addition to expenditures for customer extension the following major work will be undertaken; addition of new distribution substations totaling 3,750 kva; increase of 52,750 kva in transformer capacity at existing substations; installation of new and modernized oil circuit breakers; construction of new operating, stores and commercial office buildings; addition of regulators and capacitors at selected station and line locations; cutover of existing primaries for 4.16-kv or 12-kv operation; extension of underground primaries and secondaries in selected locations; reconstructions, reconductoring and repoling on existing lines.

California Pacific Utilities

A large proportion of our construction budget for 1955 was expended to increase system distribution capacity as required because of load growth on urban and rural distribution systems. A total of five construction projects involved increases in substation capacity, a part of which will not be completed until the first quarter of 1956. The substantial increase in the use of electric service was generally distributed over the company's entire system in the five Western states in which we operate, with system demand increasing by approximately 16%.

Our plans for 1956 include the addition of approximately 12,000 kva of substation capacity in four substations, where load growth is rapidly using up spare capacity.

Increase in use of electric service by our customers during 1955 continues at a very satisfactory rate with electric revenues increasing by approximately 6%. The company's residential customers also increased their average annual use of electricity by nearly 9% to approximately 5,400 kwh annually. A similar increase by our rural customers is indicative of their appreciation of the value of electric service. Nearly 1,000 hp of new irrigation pumping loads were connected to rural distribution on our eastern Oregon and Nevada properties.

The addition of a number of short-wave radio stations on various parts of our system during 1955 contributed considerably to maintaining satisfactory service. Supplemental units will be added during 1956 and our southern Nevada and California service areas will be similarly equipped during the coming year.

The addition of the above-mentioned 12,000 kva of new substation capacity on our eastern Oregon and Idaho properties will expend approximately 12% of our 1956 budget and expenditures for additional urban distribution capacity will probably take 15% more. Planning of numerous rural irrigation pump installations is estimated to require nearly 10% more of our 1956 construction budget.

At least three more housing projects are planned on various parts of the company's service area and rumors of others in preliminary stages of planning are prevalent in areas where governmental and industrial projects are being built or projected. This includes northern California service areas where new lumber mills are being constructed and Trinity County where a large governmental construction project will begin.

Several new street lighting installations were completed last year and a number of additional installations are planned in communities where older systems are still in use. The addition of these new systems during 1956 will complete the installation of new high-intensity street lighting systems in practically every community of the company's service area. All systems have been built at the company's expense with many municipalities increasing their payments for street lighting service by a substantial percentage. Construction budget expenditures for new street lighting facilities have been found to be highly desirable on the basis of a contribution to public safety as well as a public relations standpoint.

The numerous planned and contingent projects over various parts of the company's system suggests that the same healthy growth shown during the past year is likely to continue at a very satisfactory rate during 1956.—*E. K. Albert, president.*

Central Valley Project, USBR

Nimbus and Folsom power plants on the American River were completed and all units placed in service. The two-unit Nimbus plant has a capacity of 13,500 kw; the four Folsom units total 162,000 kw.

On Oct. 19, groundbreaking ceremonies were held to initiate preconstruction activities at the site of Trinity Dam, principal structure of the newly authorized Trinity River division in northern California. The authorizing law directed the Secretary of the Interior to carry out engineering studies and negotiations for the sale of falling water to other agencies, as a possible alternative to construction of power facilities by the bureau. The Secretary is to report his findings to Congress for further approval. Tentative plans for the division calls for development of power at four plants and more than

1,000,000 acre-ft of water each year for irrigation.

Glendale PS Dept.

The current budget for this fiscal year is approximately one-half that of last year, due primarily to the completion of two new 8,000-kva distribution substations. No such expansions of station capacity are contemplated for the current year.

Total budget for the 1955-56 fiscal year is $1,010,000, the principal items of which, other than the normal program, are the installation of two new underground 4-kv feeders, the replacement of an existing overhead 2,400-v circuit with a new underground feeder and the replacement of one induction voltage regulator with a larger step-type regulator.

The normal budget program will remain substantially the same and will consist principally of replacing the older overhead pole lines that have passed their economic life, as well as the usual construction to serve new customers' loads.

Continued progress was made during the second year of an eight-year street light improvement program; 402 luminaires in residential areas were changed from old-style radial-wave reflectors with bare lamps to 2,500-lumen lamps in refractor-type enclosing globes and 97 20,000-lumen mercury vapor units were installed on major thoroughfares.

Increases in both maximum demand and kwh consumption reflect two factors making them larger than last year. The peak demand of 54,300 kw was 15.1% above the 1954 peak, half of the increase or 7.5% was due to system growth and the remainder was the result of the addition to the system of 4,072 meters on the distribution system in an area recently purchased from the Southern California Edison Co. The kwh consumption of 216,111,000 was 12.7% above last year; an increase of 8.4% was due to normal system growth and the remaining increase was the result of annexation. During the year, 6,278 kva of distribution transformer capacity was added, and 1,295 new meters were added to the system as a result of normal growth.—*L. W. Grayson, general manager and chief engineer.*

Imperial Irrigation District

In 1955 capital expenditures on the district's power system amounted to approximately $4,500,000. It is expected that in 1956 there will be expended approximately $8,000,000 for system additions and betterments.

Preliminary grading and access road construction on the 33-mw Pilot Knob hydro plant on the upper All-American Canal was completed early in the year and in May 1955 construction work was started on the power plant, intake works, penstocks and substations, under contract with Gunther-Shirley-Lane. This work is scheduled for completion near the end of 1956. As a part of the same project, construction was started in November 1955 on a 92-kv transmission line between Pilot Knob and Drop No. 4 hydro plant, with completion scheduled for April 1956.

Curtailment of energy deliveries from Colorado River plants of the Bureau of Reclamation, together with upwardly revised future load estimates, required the initiation, during 1955, of engineering work and procurement on a 44-mw addition to El Centro steam station, to be designated as unit No. 3. Present schedules call for start of construction early in 1956 with commercial operation of the unit planned for July 1957.

No additional transmission substation capacity was added, but distribution substation capacity was increased by 22,150 kva during 1955.

The 1955 system peak reached 102,100 kw, exceeding the 1954 peak of 86,500 kw by 18%.—*B. A. Weiss, executive engineer and general superintendent.*

Los Angeles Dept. of W&P

Construction expenditures in 1955 for new and improved plant facilities were approximately $54,700,000. The 1956 budget provides for a continued high level of construction; the amount, inclusive of additions and betterments to existing plant, approximates $65,950,000.

Unit No. 3 at Valley steam plant was placed in service during the year adding 156,250 kw of steam generating capacity to the system. No new hydroelectric plant capacity was added but construction continued on a reregulating reservoir for the Owens River Gorge power plants designated Pleasant Valley Dam. This dam will permit storage of water below these plants and will make available their full peaking capability. A 3,200-kw generating plant will be installed at the Pleasant Valley Dam site to utilize the 70-ft drop.

No new overhead transmission lines were constructed during 1955; however, extensive reconnections were made in the transmission system resulting in a change in the operating voltage of certain sections of line. During the year 11.7 circuit miles of 138-kv single-conductor 1,500 MCM oil-filled lead-covered underground cable were installed as part of a new link in the belt lines interconnecting receiving stations.

Two new receiving stations were placed in service. These together with bank changes in existing stations added 532,000 kva of transformer bank capacity to the system. Three new distributing stations were completed and these together with transformer bank changes in existing stations increased the distributing station bank capacity by 144,000 kva. Distribution lines were added as follows: 33.8 circuit miles of 34.5-kv overhead and 11.9 miles of 34.5 underground; 126 miles of 4.8-kv overhead primary; 16.7 miles of 4.8-kv underground primary. The 1955 system peak was 1,187,000 kw on Dec. 1.

Construction continues at the Valley steam plant. The fourth unit with a capacity of 156,250 kw is scheduled to go in service in March 1956, resulting in a total installed capacity of 512,000 kw at this plant. Construction will be commenced in the new Scattergood steam plant, the first unit of 156,250 kw being scheduled for operation in September 1958. The 3,200-kw hydroelectric generating plant at the Pleasant Valley Dam located approximately 2.5 miles below the Owens River Gorge control power plant is scheduled for completion in November 1956.

It is planned to start construction of 138-kv transmission lines for Scattergood steam plant during 1956, the lines to be completed in 1957. There will be two circuits from the plant to receiving station D, and two circuits to receiving station K. To obtain high current-carrying capacity per circuit, use of twin conductors for each phase is planned. Construction will include both double-circuit and four-circuit tower lines. New 138-kv underground cable construction will include a second circuit of 3.7 miles from Kenter Rack to receiving station K.

Receiving station capacities will be increased by a net addition of 120,000 kva. Four new distributing stations are scheduled for service during 1956 which, together with transformer bank changes in existing stations, will increase the distributing station capacity by 157,000 kva. New distribution line construction in circuit miles will include: overhead, 42 miles of 34.5 kv and 126 miles of 4.8 kv; underground, 10 miles of 34.5 kv and 18 miles of 4.8 kv. The system generation peak, according to present estimates, should approximate 1,280,000 kw.

Since this department's operations are based on fiscal years ending June 30, the statistical and program data above are also related to fiscal years rather than to calendar years.—*Ivan L. Bateman, chief electrical engineer and assistant manager.*

Work progresses on second 40,000-kw unit at Broadway plant of Pasadena L&P Dept.

Modesto Irrigation District

Capital expenditures for 1955 were approximately $572,000 and are anticipated to be $803,500 in 1956. Eleven and one-half miles of 69-kv transmission lines were built, but this is energized 12-kv until such time as a new 69/12-kv substation is added to the system. Approximately 1,000 new services were added during 1955.

About 10 miles of 4-kv and 12-kv distribution lines were constructed during 1955 and the same rate of construction is expected during 1956.

Two new underground vaults were constructed during 1955 with one 500-kva three-phase network subway unit in each. At the present one of these is in operation and the other will go on the line in the near future.—*C. E. Plummer, chief engineer.*

Pacific Gas and Electric

The company's 1955 system output of more than 21 billion kwh was 10% over the 1954 output.

Approximately $100,000,000 were spent on electrical facilities alone in 1955, compared with $127,000,000 in 1954 and an estimated $85,000,000 in 1956. Total gas, electrical and other expenditures from the start of 1946 through 1956 will approximate $1.6 billion.

The first of two 165-mw units at Morro Bay steam plant in San Luis Obispo County was placed in operation in October 1955. The second unit is scheduled for the early part of this year. Total cost of the Morro Bay plant is estimated at $44,300,000. Construction of the single 50-mw unit at Humbolt Bay steam plant near Eureka is well under way. It is anticipated that this $8,600,000 plant will be operative by this coming autumn.

The two-unit, 95-mw, Pit River No. 4 hydroelectric development in Shasta County also was placed in operation in October 1955 at an estimated cost of $25,200,000. Ground was broken in September 1954 for the 106-mw Poe hydroelectric development on the north fork of the Feather River. The two-unit plant is expected to cost $34,900,000 and to be in operation by the summer of 1958.

Application was made to the California Public Utilities Commission in December of last year for the addition of Unit No. 4 at Station P, San Francisco, near Hunters Point. The 165-mw addition to this steam-electric plant is anticipated to be placed in operation during the summer of 1958 and will increase plant capacity to 427 mw. Construction is estimated to cost $21,000,000.

Transformer capacity of 728 mva, including 300 mva of step-up capacity at generating stations, was added to the transmission substation system last year. This figure represents 230/115 kv, 115/60 kv and 115/70 kv autotransformer capacity, except for the step-up portion. For 1956, it is estimated that 417 mva of capacity will be added, including 267 mva of step up.

Approximately 270 line miles of transmission line (60 kv through 220 kv) were constructed in 1955. About 115 line miles are planned for the current year.

Several distribution substations were added or enlarged during the past year, adding about 131 mva of transformer capacity. Approximately 208 mva are estimated to be installed this year. These capacities represent secondary voltages under 50 kv and primary voltages up to and including 115 kv. Construction and extension of distribution lines totaled 1,800 line miles during 1955 and the same number are estimated for 1956.

The company's electric customers totaled 1,690,000 at the end of 1955, an increase of more than 65,000 over 1954.—*Walter Dreyer, vice-president and chief engineer.*

Pasadena L&P Dept.

During the fiscal year 1954-55, energy sold in Pasadena exceeded the previous year by 5.5%. Total revenues increased 3.8% and operating expense 0.9%. Additions to capital amounted to $845,313.78. Construction work in process account on June 30, 1955, amounted to $7,233,924.99.

Distribution transformers in service increased from 101,098 kva to 113,276 kva or 12%. Number of meters increased from 45,990 to 47,150 or 2.5%.

During the past year the first 40,000-kw generating unit at the Broadway generating station was completed and placed in service. Work was also started on the second 40,000-kw unit for this station. The second unit is scheduled for completion during the winter of 1956-57. The first four-circuit unit for the Fair Oaks substation was installed and placed in operation. Work was started on the Chester substation which when completed will have four four-circuit units. Two 34,000-v subtransmission lines were installed and placed in operation. These lines were temporarily placed in operation at 17,000 v and will be cut to 30,000 v in the near future. The Light & Power Department is busily engaged in converting its 2,400-v distribution circuits to 4,160 v. The cuts on the circuits feeding out of the Glenarm substation were completed during the past year.—*A. W. Cartnell, general manager and chief engineer.*

Riverside PU Dept.

The Riverside Light Department's 1955 one-half million dollar budget marked for expansion enabled it to keep pace with the soaring population and load growth experienced by most southern California cities. An equal budget to meet this expected continued growth is scheduled for 1956.

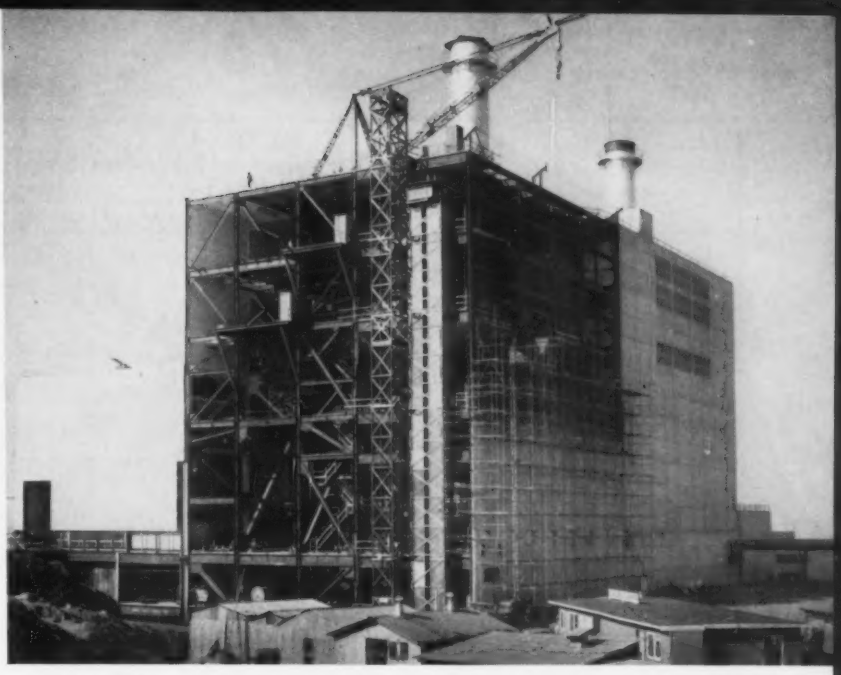
With a major freeway being constructed by the state pushing through the heart of the city, the major construction project for the year consisted of relocating a large portion of the underground distribution and overhead transmission and distribution lines and other facilities.

For rerouting the 10 4,160-v underground distribution feeders beneath a 20-ft freeway fill, a 72-in.-diameter concrete pipe was installed for 400 ft with access manholes at either end.

The 1955 system peak of 31,000 kva that occurred in December was closely approached during the summer heat wave, thus indicating the effect that the growing air conditioning load is having on a city such as Riverside.

The number of meter connections increased from 23,356 in 1954 to 24,966 in 1955. Electric range installations increased by 1,400, most of which were installed by the department at no cost to the customer.

Approximately 1,000 kva of newly connected wind machines were absorbed on the system with the help of a recently installed 2,000-kva package-type substation that was located in the heart of the city's citrus belt.—*D. D. Campbell, associate engineer.*



Second 100,000-kw unit at Encina is scheduled for August this year by San Diego G&E

Sacramento MUD

Plant expenditures for the year 1955 amounted to a record-breaking $7,200,000. Included were such major items as the 320,000-kva, 230/115/69-kv Elverta substation and 18 miles of 115-kv double-circuit steel tower line between Elverta and Hedge substations. Other construction included 41 miles of 23-kv and 69-kv subtransmission lines, a 35,000-kva, 115/69-kv addition to the South City substation and approximately 25,000 kva in additional distribution substation capacity.

System peak demand during 1955 rose to 193,000 kw and energy sales amounted to 820,000,000 kwh. These figures are approximately 13% and 12% greater, respectively, than 1954. Consumers served at the end of the year totaled 122,500, an increase of approximately 7%.

The 1956 budget includes $7,300,000 to continue plant expansion at about the same accelerated rate. Plans call for the completion of transmission and substation facilities to permit the district to receive power directly from the Central Valley Project. A 3-mile, 115-kv, double-circuit steel tower line is scheduled to complete the link between Elverta substation and South City substation; and a 21-mile, 115-kv, single-circuit line is to be built between Folsom Dam switchyard and Hedge substation. Also included in the 1956 construction program are 57 miles of 23-kv and 69-kv subtransmission lines, further expansion of the 115/23-kv South City substation with the addition of two 25,000-kva transformers and switchgear, and the addition of 27,000 kva of unit substation capacity to supply the 4-kv and 12-kv distribution systems.

Plans are progressing for a new office building and it is hoped that construction can be started before the end of 1956.

Underground system supply will be bolstered during 1956 with the addition of a 115/12-kv, double-ended, transformer - switchgear combination. This will provide additional firm capacity of 28,000 kva for the expansion of the 12-kv fed secondary network. Installation of 16 12-kv network units, totaling 8,500 kva, is planned in order to take care of new load and the continued conversion of the old 4-kv fed underground system to the new 12 kv.

Construction of SMUD's upper American River hydroelectric project will begin as soon as water-right permits have been obtained from the state engineer's office and a license for construction has been granted by the Federal Power Commission.

Applications to both agencies are on file. A hearing on water rights has been scheduled tentatively for late spring of this year. The Federal Power Commission is now reviewing the application for license. Actual construction of the first phases of the project is planned for 1957.—*Charles R. Day, supervising electrical engineer.*

San Diego G&E

The company's highest system peak of 417,000 kw was reached in December 1955 and surpassed the 1954 peak by 28,000 kw or 7.2%. Normal weather conditions probably would have increased this load.

Total capital expenditures in 1955, for electric plant, amounted to approximately $14,400,000, the major portion of which was used at Encina steam-electric generating station for unit No. 2 now under construction. About $7,000,000 were spent on this project in 1955. Other electric production projects totaled about $400,000. New customer extensions cost $3,000,000 in 1955 as compared with $2,700,000 in 1954. Almost $1,000,000 were used for betterment of transmission facilities and $2,600,000 were required for distribution line and substation projects other than new customer extensions. The remainder of $400,000 was spent for general plant equipment common to all departments of the company.

Our preliminary estimate of 1956 expenditures for plant additions is $13,800,000. Of this amount, about $3,800,000 will be needed to complete 100,000-kw unit No. 2 at Encina. Construction is on schedule and a completion date of Aug. 1, 1956, is expected to be met. About $800,000 have been designated for other electric production projects including purchase of land for a proposed future generating station. Expenditures of $2,600,000 for transmission facilities include a $740,000 addition to 138-kv Mission substation. Line extension work for new customers is expected to cost $2,400,000 and construction on other distribution projects will total about $3,400,000. Almost $800,000 will be invested in general plant, a large portion of which will represent part of the cost of a new office building estimated to be completed in 1957. It will accommodate the entire accounting department.

About 11,700 new electric customers were added in 1955, thereby bringing our total of electric customers to ap-

REA Operations—11 Western States—1955

State	Cumulative Construction Loans	1955 Loan Approvals Amount*	Estimated Miles†	Estimated Consumers†	Energized Systems To Dec. 1, 1955 Miles	To Dec. 1, 1955 Consumers‡	To Dec. 31, 1954 Miles	To Dec. 31, 1954 Consumers‡
Arizona	$ 21,317,369	$ 961,000	267	2,033	4,469	13,102	4,285	12,155
California	21,023,178	5,562,000	436	14,752	3,237	35,988	3,064	36,422
Colorado	89,926,741	24,335,000	2,462	9,582	29,987	69,817	28,748	64,629
Idaho	17,044,795	1,739,000	158	452	6,328	14,198	6,389	14,937
Montana	49,459,034	2,522,000	896	1,293	26,332	39,436	25,613	38,695
Nevada	353,540	0	0	25	165	765	165	759
New Mexico	64,243,499	2,250,000	435	3,326	19,105	44,721	18,234	43,165
Oregon	35,120,958	1,451,000	311	505	9,809	31,571	9,329	31,678
Utah	8,840,907	2,950,000	393	520	1,835	4,547	1,684	4,227
Washington	36,565,710	805,000	44	746	13,502	34,638	13,324	34,075
Wyoming	30,704,217	3,821,000	1,529	2,104	13,196	* 20,429	12,192	19,955
Total	**$374,599,948**	**$46,396,000**	**6,931**	**35,338**	**127,965**	**309,212**	**123,027**	**300,697**

* Loans made during year.

† Net increase or decrease during year.

‡ The definition of a consumer as reported by REA borrowers was revised, effective Jan. 1, 1955. Figures are on the former basis for Dec. 31, 1954, and on the new basis for Dec. 1, 1955. The change resulted in a downward adjustment, chiefly through elimination of idle services.

proximately 250,000. After eliminating the 2,175 customers acquired in 1954 through purchase of the Escondido Mutual Water Co.'s distribution system, 1955 shows a customer gain exceeding the 1954 gain by 20%.

Continued heavy influx of population and suburban housing developments accounted for 311 miles of transmission and distribution lines added to the system in 1955, with 344 miles planned for 1956. About 71,000 kva of transmission and 29,000 kva of distribution substation transformer capacity were added in 1955. Kva additions in 1956 are expected to be slightly higher.—*H. A. Noble, vice-president in charge of operation.*

Southern California Edison

Approximately $90,000,000 were expended during the year 1955 for plant additions to generation, substation, transmission line, distribution line and other system betterments. The budgeted amount for the calendar year 1956 is approximately $125,000,000 for like system additions and betterments. More than half of the 1956 budget is assigned for new operating capacity, most of which is for the four new steam-electric generating units under construction. These are expected to add approximately 660,000 kw to the net effective operating capacity of the system within the next two years.

During the past year, 1,020 line miles of distribution circuits were placed in service and 108 miles of transmission circuits were constructed. Sixteen new distribution substations were constructed with a capacity of 132,000 kva. Transformer capacity of 146,000 kva was added to existing distribution substations and 51,000 kva added to existing transmission substations. More than 85,000 new meters were connected to the system.

Construction work on the initial unit of the El Segundo steam station, started in the fall of 1953, was completed and the unit (El Segundo unit No. 1) was placed in commercial operation May 25, 1955. El Segundo steam station is located in the city of El Segundo, Calif., on a 25-acre ocean-front site adjacent to the El Segundo refinery of the Standard Oil Co. Steam is produced in a single boiler having an operating capacity of 1,140,000 lb of steam per hour for delivery to the turbine throttle at 1,800 psig, 1,000° initial temperature with 1,000° reheat. The turbine is a tandem-compound, 3,600-rpm unit, directly connected to the main generator and to an auxiliary generator. The unit has increased the system net effective operating capacity by 175,000 kw. Construction of a second similar unit was initiated in September 1954 and is approximately 60% complete. The second unit is scheduled for commercial operation in September 1956. Cost of the station with its two units and accessories, but exclusive of the cost of transmission lines, is estimated at approximately $45,000,000.

A major construction job of preventive maintenance to mitigate the effect of freezing and thawing on the exposed surface of the dams at Huntington Lake of the Big Creek-San Joaquin River development was completed during the year. The water level was drawn down to the lowest level required for the job and the upstream concrete surfaces of dams No. 1 and No. 2, the two principal dams at Huntington Lake, were resurfaced by the installation of welded steel plates backed by new concrete. Work was started in June and completed by November at a cost in excess of $653,000.

Late in 1954, construction of Alamitos steam station was authorized. The station is located on a site of approximately 200 acres of undeveloped lands near Alamitos Bay and east of Long Beach, Calif. Physical construction of the first unit was started Feb. 9, 1955, and this unit is scheduled for commercial operation in November 1956. A second unit was authorized in April 1955 and commercial operation of this unit is scheduled for September 1957. Each of the two steam turbo-generator units with its individual boiler is similar to the El Segundo units No. 1 and No. 2, and each is expected to increase the system net effective operating capacity by 165,000 kw. Cost of the station with its two units, but excluding the cost of new transmission lines, is currently estimated at $45,000,000. The layout of the site provides space for the installation of two other similar units when the need arises.

Construction of Redondo unit No. 6, at the Redondo steam station No. 2, was authorized in July 1955. This unit is similar to El Segundo units No. 1 and No. 2 and Alamitos units No. 1 and No. 2. It is scheduled for commercial operation in September 1957, and is expected to add 165,000 kw to the system net effective operating capacity. Estimated cost of the unit, exclusive of transmission lines and certain facilities installed for joint use of units No. 5 and No. 6 at the time Redondo unit No. 5 was built, is approximately $19,700,000. Estimated cost of Redondo steam station No. 2 with both units, but excluding transmission lines, is $46,347,000.

Construction of a 10,000-kw hydroelectric power plant to be known as Portal power plant was started during the year. It is to be located near the outlet of the existing Ward tunnel at Huntington Lake in the Big Creek-San Joaquin River development, Fresno County, Calif. Construction work will extend over two seasons; penstocks, foundations and structures were completed in 1955, and the installation of machinery will follow in 1956. The

plant is scheduled for commercial operation in November 1956. It is estimated that the plant will produce an average annual energy output of 56,000,000 kwh. Estimated cost of the plant, excluding the cost of a 33-kv transmission line connecting the Portal plant with the existing Big Creek No. 1 plant, is approximately $2,500,000.

Preliminary work was started late in 1955 on two new transmission substations—Del Amo and Ellis—scheduled for operation in 1956. Del Amo substation will be located in the southeasterly portion of Los Angeles County. The 1956 installation at Del Amo will consist of two 220/66-kv transformer banks, one of 75,000 kva and the other of 90,000/120,000 kva, with four 220-kv lines and eleven 66-kv lines and with space for additional 220-kv and 66-kv positions as required. Two 220-kv transmission lines will be constructed on double-circuit steel towers from Alamitos steam station to Del Amo substation, a distance of approximately 5.3 miles. Del Amo substation will serve the dual purpose of receiving a part of the output of Alamitos steam station and also will be a source of 66-kv supply to contiguous areas served by the company. It will be interconnected with the company's 220-kv transmission system by utilizing existing 220-kv lines to Barre, Center and Lighthipe substations. The presently estimated cost of these station facilities at Del Amo and the new 220-kv circuits is approximately $4,073,000.

Ellis substation will be located on a plot of approximately 54 acres on the west side of the Santa Ana River some six miles south of Santa Ana, where it will provide a source of supply to a rapidly developing section of Orange County. The 1956 installation will consist of a 90,000-kva 220/66-kv transformer bank, two 220-kv lines and eight 66-kv lines, and with space for additional 220-kv and 66-kv positions as required. The two 220-kv lines will interconnect with the company's 220-kv system at Barre substation, approximately 13.2 miles to the northwest. Estimated cost of these facilities, including the two 220-kv lines, is approximately $3,075,000.

In addition to the two new transmission substations referred to above, 15 new distribution substations are planned for construction in 1956. These new transmission and distribution substations, together with additional transformer capacity to be installed at existing transmission and distribution substations, will require approximately 658,700 kva of new transformer capacity.

Plans are in progress to construct 1,115 line miles of transmission and distribution circuits in 1956 and to connect approximately 80,000 new meters. —*H. A. Lott, executive engineer.*

Turlock Irrigation District

Load growth in the Turlock Irrigation District was 8% during 1955. Requirements of 18,433 customers brought system peak up to 27,700 kw and consumption to 147,000,000 kwh.

Construction expenditures of $727,000 were made for 17 miles of 12-kv line, 9 miles of 115-kv line, addition of 5,000-kva substation capacity and partial construction of two 115/69-kv substations.

Provision for future further growth is planned in a construction budget of $550,000 for 1956. This is to cover completion of the two substations now in progress, plus the addition of 2,500 kva at an existing 69-kv substation, and further additions to the 12-kv distribution system.—*L. H. Parker, electrical engineer.*

Colorado

Colorado Central Power

Growth in new customers during 1955 showed an increase of 6½% over 1954. Kilowatt-hour sales were up 9½% and system peak demand increased 6½%. The company spent for construction during 1955 $1,185,000. However, the construction forecast for 1956 indicates that $2,850,000 will be needed.

During 1955, $750,000 were spent for connecting new customers and routine replacements; $300,000 were spent for major system improvements, and $135,000 for additions and improvements to company buildings, transportation equipment and other miscellaneous capital improvements.

During the year in the Arapahoe County district, the company completed the major 13-kv feeders from a second 115/13-kv, 15,000/25,000-kva substation which was put into service early in the year. Considerable more cutover work was completed in the change-over from 4 kv to 13 kv wye in the urban area of Englewood and Littleton. Numerous new subdivisions sprung up in the suburban area around Englewood and Littleton, which necessitated rebuilding some of the fringe feeders.

A new highly restricted county club area was started that required a complete underground system to serve the club house buildings and a restricted residential development. Aboveground transformer vaults were designed for these services because a considerable amount of ground water in spring and summer made underground vaults undesirable and because of lot size no secondary system was used, but rather all services (1/0 and larger) were brought directly to each vault. Four kilovolt was selected as the most economical distribution voltage within the underground area. CSP transformers and bayonet-type fused switches were used for branch lines and junctions, with transite barriers installed in the vaults to limit flashover to ground in the event faults caused fuses to blow. This layout was fault tested to check proper-type barriers.

The cutover from 13 kv delta to 13 kv wye was virtually completed in the Golden district with neutrals installed under practically all 13-kv feeders and a number of small 13/4-kv substations will be eliminated during 1956. Also, much progress was made in a similar program in our Evergreen district. In the Fort Lupton district, a drought caused an unusual demand for new irrigation pumps. However, with a generous use of regulators and capacitors, no serious capacity problem developed.

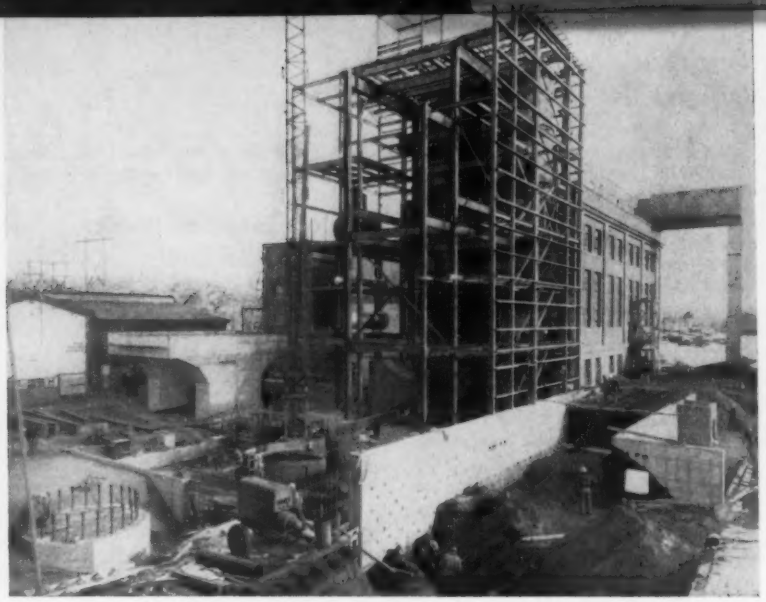
During 1955 a microlink system was set up with the use of 960-mc and also 2,600-mc equipment. This system will be put in service early in 1956 to provide better control of mobile two-way radio equipment and voice channels for interdistrict communications, tele-

Farm Electrification by States

State	Total Farms November 1954*	No. Farms Electrified July 1, 1955	Unelectrified Farms July 1, 1955	Per Cent Electrified Farms
Arizona	9,321	8,071	1,250	86.6
California	123,074	118,074	5,000	95.9
Colorado	40,749	35,449	5,300	87.0
Idaho	38,735	37,535	1,200	96.9
Montana	33,059	28,009	5,050	84.7
Nevada	2,857	2,057	800	72.0
New Mexico	21,070	16,970	4,100	80.5
Oregon	54,442	52,942	1,500	97.2
Utah	22,825	22,125	700	96.9
Washington	65,175	64,075	1,100	98.3
Wyoming	11,392	9,642	1,750	84.6
Totals	**422,699**	**394,949**	**27,750**	**93.4**

* 1954 U. S. Census of Agriculture, preliminary.

Booster station. Colorado Central Power



Major construction by Southern Colorado Power Co. was completion of Canon City plant

metering. Switching control will be added later.—*Lee R. Jones, vice-president in charge of operations.*

Colorado Springs PU Dept.

Load increases continue in this area at an average rate of about 12% per year. A new 22,000-kw steam unit is expected to be in service by the end of the year and planning of the next unit of probably 33,000 kw capacity, to be in service in 1959, has begun.

Transmission facilities for this year will consist chiefly of service lines to the new Air Force Academy. A considerable amount of extensions and reinforcing of the distribution system will be required this year in the city. Two or three 2,500-kw substations will be required.—*F. H. Wiley, superintendent, electric division.*

Public Service of Colorado

Public Service Co. of Colorado construction expenditures during 1955 were approximately $23,900,000, of which $17,800,000 were for electric facilities. The 1956 total construction program is presently set at $27,410,000 with electric facilities requiring $20,214,000.

In October 1955 a generating unit of 112,500-kw capability was placed in service at Arapahoe steam-electric station in Denver. Ground was broken on Sept. 9 for the initial 100,000-kw generating unit at a new site north of Denver to be known as the Cherokee station. This unit is scheduled for commercial operation in 1957. Also a 22,000-kw steam-electric unit is scheduled for service in 1957 at a new site near Grand Junction in western Colorado to be known as the Cameo station.

During 1955 approximately 13 miles of 115-kv transmission lines were placed in service in the Denver area, and approximately 10 miles of 69-kv line and 4 miles of 44-kv line were added to the system. A new 20,000-kva 115-kv distribution substation was completed and placed in service near Boulder, Colo., in March. Transmission substation capacity was increased by a 120,000-kva, 115/13-kv transformer bank for the new generating unit at Arapahoe station. Additions to the distribution substation capacity to serve load growth totaled 92,000 kva. Approximately 17,000 new electric customers were connected during 1955. The maximum peak demand on the company's system of 456,490 kw occurred in December and exceeded the demand in 1954 by 12%.

Construction of transmission facilities in 1956 will include 62 miles of 115-kv, 27 miles of 69-kv and 11 miles of 44-kv lines and 10,000 kva of substation capacity. Expenditures on distribution facilities, in addition to extensions, services, etc., will provide 150,000 kva of substation capacity at various locations including a 115-kv substation in Denver.—*E. F. Nussbaum, assistant treasurer.*

Southern Colorado Power

A new 16,500-kw steam generating unit was placed in service on Sept. 1, 1955, at Canon City, Colo.

A new 115/69-kv substation and switching structure has been started on the west outskirts of Pueblo. This station will cost about $800,000 and will become a focal point of the system, serving as a terminal for all 115-kv lines and for the new 69-kv loop around Pueblo. About one-fourth of this loop was built in 1955. The station itself, scheduled for completion in mid-1956, will be controlled from the Pueblo plant by microwave.

A new 115-kv transmission line will be built in 1956 from Pueblo to La Junta, a distance of 74.4 miles and a terminal substation at La Junta will be started in the same year. Expenditures for new facilities in 1955 will be about $4,000,000, a portion of which is final costs on the new plant completed, while 1956 will see an expenditure of about $3,000,000, a third of which will be for transmission lines and substations.—*W. C. Porter Jr., vice-president in charge of operation.*

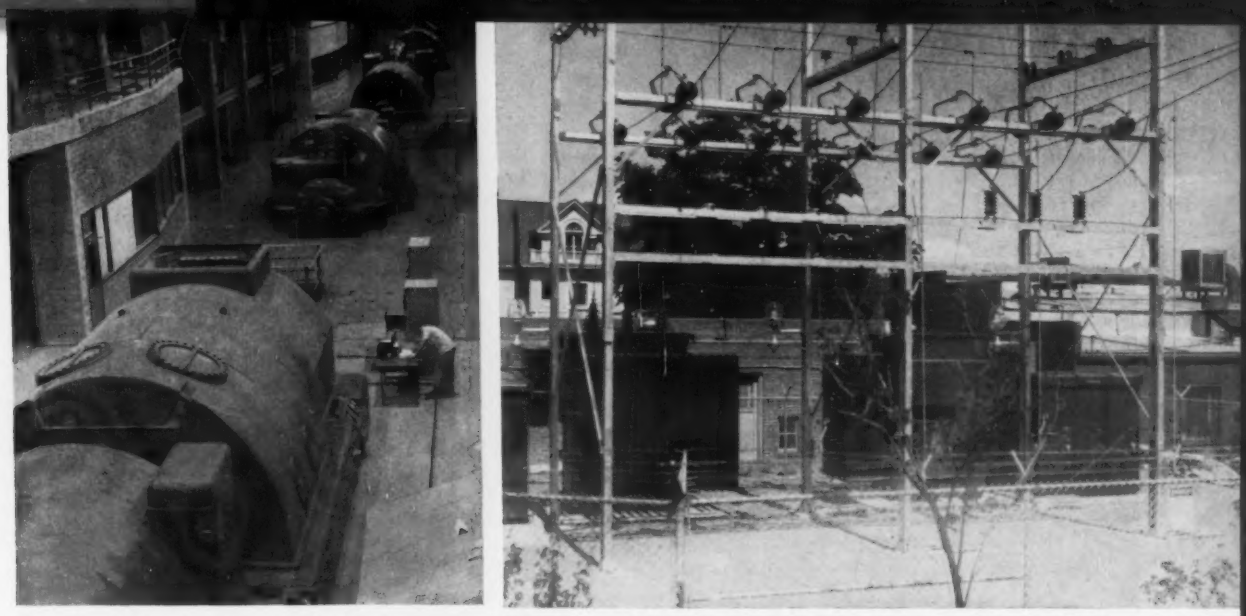
Idaho

Albeni Falls Dam Army Engineers

Albeni Falls Dam project on the Pend Oreille River in northern Idaho was practically completed in 1955. All three of its 14,200-kw generators were placed on the line, the first in March, the second in May and the third in August, by Seattle District, Corps of Engineers, U. S. Army. The project was dedicated June 24, 1955. The dam with spillway was completed in June 1952 and the power house structure was completed in August 1954. This is a $31,100,000 upstream-storage and other public-benefits project in the Columbia Basin comprehensive-development program. The Albeni Falls Dam reservoir includes 25 miles of Pend Oreille, one of the West's largest natural lakes. The pool's usable storage capacity is 1,153,000 acre-ft.

Idaho Power

Idaho Power Co., serving the region composed of southern Idaho, eastern Oregon and northern Nevada, spent



New unit added at Arapahoe. PS of Colorado; two 2,500-kva units were added to Pickard substation in Reno by Sierra Pacific Power

$6,530,000 on new and improved facilities during 1955. Transmission and distribution lines as well as substations accounted for most of this expenditure.

As a result of a favorable decision by the Federal Power Commission, work on the Hells Canyon sites has started. Brownlee plant is being accelerated as fast as conditions will permit.

During the year 1955 Idaho Power completed 52 miles of transmission line. The largest transmission item during the year was 46 miles of 230-kv line between Baker and LaGrande, Ore., which will be available for energizing in the early spring of 1956. A continuing program of rebuilding and extending of distribution lines was necessary to cope with the ever-increasing loads.

The 1956 budget is $33,508,000. This large increase is mainly occasioned by the construction of the Brownlee plant and a start on other associated projects in the Hells Canyon area. A greatly expanded program within the company is also necessary to distribute the additional energy from these projects. Ten new distribution substations are planned in the area during the year. The company will continue to expand its present microwave system and by the end of 1956 will have channels extending across the system.

The year 1956 will also witness the completion of a major addition to the general office in Boise, increasing space approximately 60%.—*J. F. Emery, superintendent, electric operation and construction.*

Palisades Project, USBR

Construction of Palisades Dam and its 114,000-kw power plant was about 90% complete by the end of the year, installation of the generators had begun and work was under way on the 60-mile-long Palisades-Goshen 115-kv transmission line. The first 28,500-kw unit is scheduled to be placed in service in December 1956 and the remaining three by October 1957.

Montana

Fort Peck Project, USBR

Construction bid invitations were issued late in the year for construction of the 13-mile Fort Peck-Whately 69-kv wood-pole transmission line.

Libby Dam Army Engineers

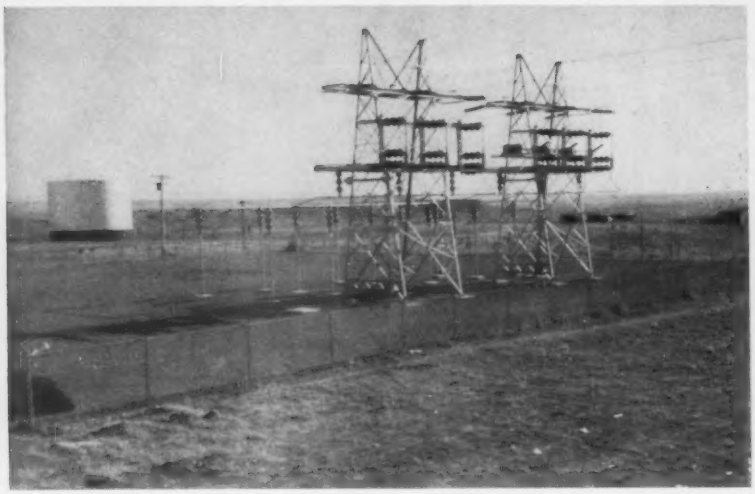
Libby Dam project, authorized for Corps of Engineers' construction on the Kootenai River in northwestern Montana, was virtually dormant during 1955. This project is dependent on approval by the International Joint Commission before Congress can appropriate construction funds, because the reservoir will involve flowage rights in British Columbia. Further work on the Libby project by the Seattle District, Corps of Engineers, awaits completion by the Canadians of a study they are making of their water resources. Much design work and preliminary engineering have been accomplished on Libby Dam by the Corps of Engineers. This will be a large upstream-storage, flood-control and power project in the Columbia Basin comprehensive-development program.

Palisades turbines. Bureau of Reclamation

Missouri River Basin Project, USBR

Power program achievements during the year included construction progress on Glendo Dam and power plant foundation in Wyoming approaching 50% and authorization of construction of Yellowtail Dam on the Big Horn River in Montana. As with the Trinity River division of the Central Valley Project, in California, the sale of falling water to other agencies is being investigated as an alternative to bureau construction of power facilities at Yellowtail. The first of Glendo's two 12,000-kw units is scheduled for initial operation in 1958.

Progress on the construction of transmission facilities during 1955 included the virtual completion of 130 miles of the 204-mile, 230-kv steel tower line between Big Bend, South Dakota and Granite Falls, Minn. Construction of foundations and towers for the remaining 74 miles from Watertown, S. D., to Granite Falls was



New switching station structure in Las Vegas division of Public Service of New Mexico

Lemolo No. 2 added. Calif. Oregon Power

well advanced during the year and the contract signed for stringing this portion of the line. Bid calls are to be issued early in 1956 for construction of a substation at Granite Falls.

In North Dakota, construction of footings and steel towers for the Jamestown-Fargo 230-kv line was under way. At the end of the year bids were being asked on construction of the 80-mile, 115-kv wood-pole line between Fargo and Grand Forks.

In other states, the 33-mile Gavins Point-Belden 115-kv line was placed in service in Nebraska and substantial progress made on the 201-mile Alcova (Wyo.)-Gering (Neb.) 115-kv line. As the year ended, work had begun on completion of 46 miles of 115-kv line joining the Yellowtail Dam site in Montana and Lovell, Wyo.

Issuance of construction bid invitations is expected early in the year for the 8-mile Alcova-Fremont 115-kv wood-pole line in Wyoming.

Montana Power

Construction work on the Montana Power Co. system during 1955 was devoted principally to general expansion and maintenance of facilities.

The capacity of the company's Sun River transmission lines in north-central Montana was doubled to provide for anticipated load growth in the next 10 years and at Havre substation capacity was increased and an operating center constructed.

Major transmission addition was construction of a 21-mile line to serve an Air Force installation at Glasgow, Mont.

The company has filed with the Federal Power Commission an application for a license to construct a 60,000-kw hydroelectric development on the Missouri River near Great Falls, Mont. This plant will be known as the H. H. Cochrane development and will be the fifth hydro plant in the Great Falls stretch of the Missouri River, bringing capability in that area to 220,000 kw. It is anticipated that construction will start in 1956 and that the plant will be in operation by late 1957.

The company also is associated with three other utilities in the Pacific Northwest Power Co., which has before FPC an application for license to construct the Mountain Sheep and Pleasant Valley hydro projects on the Snake River in Idaho. These developments will have a combined capability of 1,183,000 kw, of which one-fourth will be available to Montana.

Nevada

Sierra Pacific Power

During the year 1955, additions and betterments to the company's electric system totaled approximately $2,000,000. More than half of this amount was spent on the expansion of electric distribution facilities, principally in the city of Reno, to meet the increasing electric demand in this section of the fast growing state of Nevada.

A 10,000-kva unit substation, 60/23 kv, and a 600-kva transformer bank, 23/4 kv, with related 23-kv and 4-kv feeders were installed in the north industrial area of Reno. The downtown commercial district was bolstered with an additional 2,500-kva, 23/4-kv unit. To provide for the increased rural load adjacent to the town of Minden, an additional bank of three 833-kva, 60/12.5-kv transformers was added to the substation and the incoming 23-kv subtransmission supply line was converted to 60 kv.

Surveys, the acquisition of rights-of-way and some minor construction were completed during 1955 for a second 120-kv H-frame interconnecting line 30 miles in length, over the High Sierra Mountains, to connect with the Pacific Gas and Electric Co at Donner Summit. The culmination of this million-dollar project will be reached in late 1956 with the completion of the line and the terminal switching and transformer station of 45,000 kva capacity north of Reno.

Work was commenced during 1955 on a new diversion dam across the Truckee River about six miles west of Reno to replace the old wood-crib diversion to Washoe hydro plant, built in 1904. The cofferdam built to divert the river's flow during the construction of the new 170-ft rock-masonry and concrete structure, was completely washed away by the December floods. Completion of this $100,000 project will be consummated in 1956.

With the conversion to the new 60-kv supply line to Minden substation it was possible to extend the 60-kv supply from Minden on up the east slope of the Sierra about 12 miles to Lake Tahoe. A 5,000-kva, 60/14-kv substation will be constructed at the south end of Lake Tahoe in 1956 at the western terminus of this line.

Continued rapid expansion of this area will require for 1956, in addition to the aforementioned construction, a further extension of the underground distribution facilities and at least two additional 2,500 kva, 23/4-kv substations and related feeder lines for the city of Reno.

First unit of Southern Nevada Power Co.'s Clark steam station went on line in December

At Carson City a 60-kv, 3,750-kva capacitor bank will be installed at the substation. An additional 28 miles of 60-kv H-frame line will be constructed from its present terminus at Lovelock, at which substation an additional 1,500 kva in 60/7.2 transformer capacity will be installed as well as a 15,000-kva voltage regulator and a 60-kv, 2,250-kva capacitor bank to bolster the 60-kv subtransmission supply as it extends northeasterly beyond Lovelock.—*M. H. Atcheson, engineer.*

Southern Nevada Power

Load growth on the Southern Nevada Power Co. system continues at an amazing rate. The increase in peak load for 1955 over 1954 was 13.5% and the increase in kilowatt hours was 35.6%.

The main power supply for the company has been from the Hoover power plant and even if the full allotment of kilowatt-hours had been available it would have amounted to only about 62% of the company's requirements. Because of low water in the Colorado River, Hoover firm power was curtailed by 38% approximately so energy had to be purchased from any source available to the Colorado River Commission for resale to this company.

The first unit (44 mw) at Clark steam station was placed in service in December. The second unit of 60 mw name-plate rating has been ordered and is scheduled for operation in the early spring of 1957. The engineering and construction contract was awarded to Stearns-Roger Mfg. Co. of Denver and construction on this unit is now under way. Our plans incorporate the development of a 138-kv transmission system and the No. 2 unit at Clark station will be connected to the system at that voltage.

During 1955 a 230-kv line was built from Henderson terminating at Clark station through a 75-mva 230/69-kv transformer to supplement the 69-kv supply from Hoover and the output from our new Clark steam station. About 16 miles of 69-kv line was built during 1955. Distribution substation capacity amounting to 18,600 kva was added during the year.

A new general office building, new service center including a warehouse, shops, meter department, garage and offices for the line department personnel and a new pole yard with handling facilities were all completed during 1955.

The money budgeted for 1956 construction and additions to the property amounts to $10,400,000 approximately. Plans are under way for the construction of about 80 miles of transmission line, which includes 63 miles of line to the Atomic Energy Commission at Mercury and the United States Air Force at Indian Springs.

Approximately 75 miles of distribution lines will be necessary together with 32,500 kva of distribution substation capacity. It is proposed to rebuild and modernize at least two of the larger distribution substations. The program calls for substantial increases in capacitor installations for power factor and voltage improvement in the distribution system.

One important project for the coming year is the installation of a proper relaying system at most of the substations. Supervisory control by microwave will be installed to these stations with the control center at Clark steam plant where the system dispatchers will be located.—*D. D. Smalley, vice-president.*

New Mexico

Public Service of N. M.

Major construction in 1955 consisted of $980,000 for extensions for service to customers, construction of two distribution substations, completion of seven miles of 115-kw transmission tie line between Public Service Co. of New Mexico and Plains Electric Generation and Transmission Cooperative at Las Vegas, N. M., and conversion of several distribution areas from 4.1 kv to 12.5 kv.

Major construction expenditures in 1956 will consist of $980,000 for distribution plant exclusive of distribution substations and $480,000 construction of 16 miles 115-kv transmission line for the Albuquerque area. One million dollars will be spent in the year 1956 on construction of a 33,000-kw steam generator at Person station, which will be completed in fall of 1957. —*M. C. Heffelman, vice-president, operations.*

Oregon

Bonneville Power Administration

Peak energy demand on the federal plants was 4,362,000 kw, 5 to 6 p.m., Nov. 14, 1955. This all-time high of demand was made possible by the addition of 14 generating units during the year. Four units were added at McNary, two at Lookout Point, one at Dexter, three at Albeni Falls and four at Chief Joseph. The ten federal plants produced 26,000,000,000 kwh for Bonneville Power Administration during 1955 for distribution over the BPA transmission system to 115 customers. Revenue from sale of this power was $56,000,000. Increases over the 1954 calendar year were: peak demand 19%; generation for BPA 22%; revenues 20%.

Expenditures for new and improved facilities during 1955 amounted to $26,000,000. Approval of the present budget before Congress will provide an estimated $24,000,000 in 1956. The estimate is based on a transmission line program that will keep pace with the schedule of additional generating plant installations. Transmission system additions during 1955 included 349 cir-

cuit miles of 230-kv and 66 circuit miles of 115-kv line, with 669,333 kva of transformer capacity. Plans for 1956 call for 234 circuit miles of 230-kv and 112 circuit miles of 115-kv line, with added transformer capacity of 2,550,665 kva.

Peak generating capacity was increased by about 775,000 kw with installation of four units each at McNary and Chief Joseph on the Columbia River, three units at Albeni Falls on the Pend Oreille River, two units at Lookout Point and one unit at Dexter, both on the Willamette River. Total federal capacity of about 7,516,000 kw is planned for installation by January 1962.

Key construction activities during 1955 centered on the administration's high-voltage grid to carry scheduled generation from McNary Dam to Portland-Vancouver and southwest Oregon load centers, and from Chief Joseph Dam to Puget Sound and Olympic Peninsula load centers.

The McNary-Ross 345-kv line, which was under construction during 1955, was completed and initially energized at 230 kv in October 1955.

The McNary-Maupin 105-mile and Detroit-Santiam 23-mile sections of the McNary-Santiam 287-kv line No. 2, which transmits power from McNary Dam to lower Willamette Valley and southwest Oregon load centers, was completed together with terminal facilities at McNary and Santiam substations and energized at 230 kv in December 1955.

BPA's 133-mile Chief Joseph-Snohomish 345,000-v line No. 3 has been under construction during 1955 and is expected to be completed and energized initially at 230 kv in February 1956.

Energization of a new 20,000-kva substation at Columbia Falls was completed in July for service to the Pacific Power & Light Co. and the Flathead Electric Cooperative.

The new 3,000-kva PeEll and 6,000-kva Timber substations were completed and energized in June 1955 providing service to the Lewis County PUD No. 1 and the West Oregon Electric Cooperative, respectively.

Contracts awarded during the year included 135 miles of right-of-way clearing, $648,000; 233 structure miles of transmission line construction, $2,347,000; substation construction $1,613,000. BPA's transmission system at the end of the year had 6,977 circuit miles of transmission line and 178 substations energized.

Bonneville's scheduled construction activities for 1956 will focus on completion of the 345,000-v lines from Chief Joseph Dam. Also the completion of the Reston-Fairview 230,000-v line will serve the southwest Oregon coastal areas. Major new starts will include a 345,000-v line from Chief Joseph Dam to Covington substation in western Washington. The Big Eddy-Oregon City-Chemawa 287,000-v transmission line will be constructed to bring additional power to the lower Willamette Valley.

Major additions are scheduled for the Big Eddy, Keeler, Longview, Olympia and The Dalles substations. A number of miscellaneous customer services and minor transmission line additions will be constructed during the coming year.

During the coming year Pacific Northwest contractors will be invited to bid on 157 miles of right-of-way clearing at an estimated cost of $1,094,000; 307 miles of transmission line construction, $3,853,000; 31 substation additions, $1,730,000; five new substations, $223,000.

California Oregon Power

Budget for 1956 is $12,096,000 as compared with capital expenditures of $11,150,000 for 1955. Lemola No. 1 hydro plant with 29,000-kw capacity was placed in operation in July of last year. Lemola No. 2 with a 33,000-kw unit is scheduled for summer of 1956 and will complete the initial chain of plants on the North Umpqua River.

During 1955 there were added 113 miles of transmission line and 204 miles of distribution lines. Corresponding figures for 1956 are 131 and 175 respectively. System peak for 1955 was 322,910 kw as compared with 301,880 for 1954, an increase of 7%. New hydro planned will bring in 80,000 kw in the fall of 1959.

Eugene Water & Electric Board

Capital expenditures in the electric department in 1955 were $1,006,000. Approximately 84% of this was for distribution construction and reconstruction, largely for transformers, change-overs from 2,400 to 12,000 v, and extension of the underground system in the business district.

For 1956 the sum of $3,604,800 has been budgeted. Of this amount $2,152,000 have been allocated to the Beaver Marsh hydroelectric project on the upper McKenzie River.

Construction of the Beaver Marsh plant can be started as soon as the voters of Eugene approve the bond issue and building specifications can be prepared for contractors' bidding. The plant would have 30,000 kw installed

Current and Future Power Transmission Lines on Bureau of Reclamation Projects

Project	State or States	Line Terminals Terminal A	Terminal B	Rating in Kilovolts	Line Length In miles	Construction Type	Estimated Year of Completion
Palisades	Idaho	Palisades Power Plant	Goshen (UP&L)	115	57	Wood pole H frame	1956
Collbran	Colo.	Molina	Cameo	69	17	Wood pole H frame	1960
Collbran	Colo.	Cameo	Public Service Co. of Colo.	69	1	Wood pole H frame	1960
Fort Peck	Mont.	Fort Peck	Whately	69	14	Wood pole H frame	1956
Mo. River Basin	Wyo.	Boysen	Pilot Butte	115	40	Wood pole H frame	1958
Mo. River Basin	Wyo.	Pilot Butte	Lander	115	30	Wood pole H frame	1959
Mo. River Basin	Wyo.-Mont.	Lovell	Yellowtail	115	46	Wood pole H frame	1956
Mo. River Basin	S.D.	Gavins Point	Sioux Falls	115	90	Wood pole H frame	1957
Mo. River Basin	S.D.-Neb.	Rapid City	Chadron	115	110	Wood pole H frame	1959
Mo. River Basin	S.D.-Minn.	Watertown	Granite Falls	230	77	Steel tower	1956
Mo. River Basin	N.D.	Jamestown	Fargo	230	83	Steel tower	1956
Mo. River Basin	N.D.-Minn.	Fargo	Granite Falls	230	169	Steel tower	1959
Mo. River Basin	N.D.-S.D.	Edgeley	Groton	115	81	Wood pole H frame	1956
Mo. River Basin	N.D.	Lakota	Grand Forks	115	61	Wood pole H frame	1959
Mo. River Basin	N.D.	Grand Forks	Fargo	115	80	Wood pole H frame	1957
Mo. River Basin	Mont.-N.D.	Dawson	Bismarck	230	208	Steel tower	1960
Mo. River Basin	Mont.	Miles City	Yellowtail	115	142	Wood pole H frame	1960
Mo. River Basin	Mont.-Wyo.	Yellowtail	Ucross	115	95	Wood pole H frame	1960
Mo. River Basin	Wyo.	Ucross	Buffalo	115	18	Wood pole H frame	1960
Mo. River Basin	Mont.	Yellowtail	Billings	115	44	Wood pole H frame	1960
Mo. River Basin	Mont.	Fort Peck	Dawson	230	130	Steel tower	1960
Mo. River Basin	S.D.-Neb.	Fort Randall	Grand Island	230	155	Steel tower	1959
Mo. River Basin	S.D.-Neb.	Fort Randall	Neligh	115	77	Wood pole	1956
Mo. River Basin	Wyo.-Neb.	Alcova	Gering	115	207	Wood pole H frame	1956
Mo. River Basin	Wyo.	Alcova	Fremont	115	15	Wood pole H frame	1957

Current and Future Development of USBR Power Projects

Project	State	River	Purpose*	Name of Plant	Year of Initial Operation	Present Kw	Present No. of Units	Ultimate Kw	Ultimate No. of Units
Boulder Canyon	Ariz.-Nev.	Colorado	I,P,F.C.	Hoover	1936	1,249,800	18	1,354,300	19
Yakima	Wash.	Yakima	I,P	Chandler	1956	0	0	12,000	2
Boise	Idaho	Boise	I,P,F.C.	Anderson Ranch	1950	27,000	2	40,500	3
Palisades	Idaho	Snake	I,P	Palisades	1956	0	0	114,000	4
Provo River	Utah	Provo	I,P,F.C.	Deer Creek	1957	0	0	5,000	2
Weber Basin	Utah	Weber	I,P,F.C.	Gateway	1957	0	0	4,000	2
Weber Basin	Utah	Weber	I,P,F.C.	Wanship	1957	0	0	1,400	1
Mo. River Basin	Mont.	Marias	I,P,F.C.	Tiber	1958	0	0	2,000	3
Yakima	Wash.	Roza Canal	I,P	Roza	1958	0	0	11,250	1
Colo.-Big Thompson	Colo.	Trans. Mtn. Div.	I,P	Big Thompson	1958	0	0	4,500	1
Collbran	Colo.	Bonham-Cottonwood Section—Mesa Pipeline	I,P	Molina	1959	0	0	5,500	1
Minidoka	Idaho	Snake	I,P	American Falls	1959	0	0	30,000	3
Mo. River Basin	Mont.	Big Horn	I,P,F.C.	Yellowtail**	1961	0	0	200,000	4
Mo. River Basin	Wyo.	North Platte	I,P,F.C.	Glendo	1959	0	0	24,000	2
Collbran	Colo.	Mesa Pipe Line	I,P	Cameo	1960	0	0	2,500	1
Mo. River Basin	Wyo.	North Platte	I,P	Fremont Canyon	1961	0	0	48,000	2
Mo. River Basin	Wyo.	Clarks Fork	P,F.C.	Bald Ridge	1963	0	0	23,000	3
Mo. River Basin	Wyo.	Clarks Fork	P,F.C.	Thief Creek	1965	0	0	125,200	3
Mo. River Basin	Wyo.	Clarks Fork	P,F.C.	Hunter Mountain	1964	0	0	14,400	2
Mo. River Basin	Wyo.	Sunlight	P,F.C.	Sunlight	1964	0	0	14,900	2
Mo. River Basin	Mont.	Missouri	I,P	Little Porcupine	1970	0	0	18,000	3
Mo. River Basin	Mont.	Missouri	P,F.C.	Portage	1965	0	0	20,000	2
Mo. River Basin	Mont.	Powder	I,P	Moorhead	1970	0	0	8,000	2
Mo. River Basin	Mont.	Marias Riv. Div.	I,P	Kenil	1970	0	0	1,600	2
Mo. River Basin	Mont.	Madison	P,F.C.	Lyon	1963	0	0	24,000	3
Mo. River Basin	Mont.	Yellowstone	P,F.C.	Absaroka	1970	0	0	50,000	3
Mo. River Basin	S.D.	Mo. Oahe Canal	I,P	Pony Hills	1966	0	0	180,000	4
Mo. River Basin	Neb.	No. Loup (offstream)	I,P	Davis Creek No. 1	1965	0	0	2,600	1
Mo. River Basin	Neb.	No. Loup (offstream)	I,P	Davis Creek No. 2	1966	0	0	11,000	2
Mo. River Basin	Neb.	Middle Loup (offstream)	I,P	Lees Park	1967	0	0	6,100	1
Mo. River Basin	Neb.	Middle Loup (offstream)	I,P	Lillian	1966	0	0	4,400	2
Central Valley	Calif.	Trinity Riv. Div.	I,P	Trinity**	1963	0	0	90,000	4
Central Valley	Calif.	Trinity	I,P	Lewiston**	1961	0	0	2,000	1
Central Valley	Calif.	Trinity	I,P	Tower House**	1961	0	0	66,000	3
Central Valley	Calif.	Trinity Riv. Div.	I,P	Matheson**	1961	0	0	75,000	3

* Abbreviations under Purpose: I—Irrigation; P—Power; F.C.—Flood Control.

** Sale of falling water to other agencies is being investigated as alternative to construction by the bureau.

Note: Future power plants are subject to Congressional appropriation of funds for their construction.

capacity and is estimated to cost approximately $8,000,000. It is hoped that construction can begin in the fall of 1956 and be completed in the early fall of 1958.

Beginning with the meter readings of Feb. 1, 1956, a rate reduction of an estimated 10% goes into effect. Revenues for 1955 will total approximately $3,450,000; therefore the reduction involves a difference in revenues based on old rates of about one-third million dollars for 1956.

McNary Dam Army Engineers

Construction work and installation of generating equipment on the McNary Lock and Dam project on Columbia River continued on schedule during 1955. Generating units 7, 8, 9 and 10 were placed in service in February, April, August and October 1955, respectively, bringing the total power installation to 700,000 kw (or 805,000 kw at 15% overload capacity) added to the regional power system. Although rated 70,000 kw, generators installed thus far have been operated continuously at an overload capacity of about 80,500 kw when water was available. The power house, substructure and superstructure were completed during the year. Expenditures for these features and for power generating and pertinent equipment comprised most of the total $17,800,000 spent on the project during the year. Other work accomplished during the year consisted essentially of completing the fish passing facilities and the final phases of the land acquisition program. Total actual project costs through Dec. 31, 1955, have been $277,000,000. Total final cost of the McNary project is currently estimated at $286,000,000.

Schedule Advanced

During calendar year 1956, installation of generating equipment for the four remaining units of 70,000 kw each are scheduled to be placed in service. Although the original contract dates for completing installation of generating units 11 and 12 were March and June respectively, it appears both units will be on the line in April 1956. This advanced schedule is based on earlier delivery of materials and shorter erection time. Unit number 14, the last, is scheduled to produce power in December 1956 making the total power installation of 980,000 kw (at least 1,127,000 kw overload capacity) available to the Northwest Power Pool to assist in supplying increased demands for ample power supply in the rapidly expanding Pacific Northwest region.

Pacific Power & Light

During the year 1955 Pacific Power & Light Co. spent more than $14,000,000 in additions and improvements. Expenditures were distributed generally throughout the system, which extends over large sections of Oregon, Washington and Wyoming and includes areas in Idaho and Montana. In November Pacific was further expanded by the merge with and into the company of Western Public Service Co., which served the city of Laramie, Wyo.

During the year, work continued on the 115-kv transmission line which, when completed, will link areas of the company in Clatsop, Tillamook and North Lincoln Counties on the northern Oregon coast. The 18-mile section of the line from Tillamook to Mohler was completed and about 80% of work on the section from Astoria to Seaside was completed at the end of the year. Clearing on the remaining 23-mile section from Mohler to Seaside was commenced with actual construction of the line to be started in the spring of 1956.

The largest item of construction in the eastern part of the system was the 17-mile 115-kv transmission line from Troy to Libby, Mont., which ties the Libby property into the Northwest Power Pool through its connection with BPA facilities at Troy.

Major substation additions were

made in Portland, Albany, Springfield, The Dalles, Mohler, Tillamook and Athena, Ore.; and in Yakima, Walla Walla and Toppenish, Wash. The large conversion programs in Walla Walla and the Yakima Valley, Wash., were continued.

The 1956 construction program for additions and improvements to the transmission and distribution system calls for expenditures of more than $17,000,000. Included in the program is a 45-mile 161-kv transmission line from Billings to Yellowtail, Mont., which, when completed, will tie Pacific's Wyoming system to the Northwest Power Pool through an interconnection with the Montana Power Co. at Billings.

Also included in the program is the construction of a 45-mile 115-kv transmission line from Yakima to Grandview in the Yakima Valley, Wash. Major distribution substation additions are planned for Portland, Albany, Coos Bay, Hood River, Seaside and Lebanon, Ore.; Walla Walla and Granger, Wash.; Sandpoint, Idaho; and Worland, Wyo.

In December 1955, the company applied for a license to construct the 225,000-kw hydroelectric plant at Swift Creek on the Lewis River, Wash. This project will cost approximately $58,000,000. It is proposed that work will commence in the spring of 1956 and will be completed late in 1958.

Plans are also being made to reinforce the power supply in the Wyoming area by the construction of a 100,000-kw steam plant. Final location of the plant has not been decided but plans are being made to initiate work before the end of 1956 and complete the project in 1958.

Portland District Army Engineers

The Portland District, Corps of Engineers, has three projects in operation and one project under construction that include power development.

Bonneville Dam on the Columbia River, 42 miles east of Portland, has been producing power since 1938 and is fully installed with 10 generating units for a total of 518,400 kw.

Detroit project on the north Santiam River, 45 miles southeast of Salem, Ore., was completed during 1954. It consists of a flood control reservoir and power house at the Detroit site with two 50,000-kw units, a reregulating dam and power house 2.8 miles downstream at the Big Cliff site with one 18,000-kw unit.

Lookout Point project on the middle fork Willamette River, 22 miles southeast of Eugene, Ore., was completed during the year. It consists of a flood control reservoir and power house at the Lookout Point site, and a reregulating dam and power house 2.7 miles downstream at the Dexter site. The upper site has three 40,000-kw units, one of which went into operation in 1954 and the other two went on the line early in 1955. There is one 15,000-kw unit at the Dexter site. It went on the line during May 1955.

General view of the new storeroom and service center of Portland General Electric Co.

The Dalles project, located on the Columbia River three miles east of The Dalles, Ore., is being constructed with an initial installation of 14 78,000-kw main units, two 13,500-kw fish channel water supply units and two station service units. Power house substructure to increase the ultimate installation to 22 main units is being provided with the initial construction. Power on the line from the first two main units is scheduled for November 1957.

Initial construction is about 50% completed. Construction of the spillway dam, including approach channel excavation and installation of crest gates, initiated in November 1952, is complete. Construction of the substructure for units 1 through 14, initiated during July 1953, is essentially complete. Work on the substructure for units 15 through 22, east fish ladder and east nonoverflow dam, started January 1954, has progressed to 90% completion. Work on the navigation lock, north nonoverflow dam and fish ladder, initiated in September 1954, is 56% complete. Power house superstructure for units 1 through 14, awarded in December 1954, has progressed to 35% completion. Contract for the closure dam was awarded in October 1955 and work is underway. Contract for power house installation was awarded in December 1955.

Contracts for the design and fabrication of turbines for the 14 main units, two fish channel water supply units, and two station service units have been awarded; and contracts for generators of eight main units, two fish channel water supply units, and two station service units have been awarded. Fabrication of turbines and generators is progressing on schedule. A contract for the remaining six main unit generators is scheduled to be awarded in May 1956.

Portland General Electric

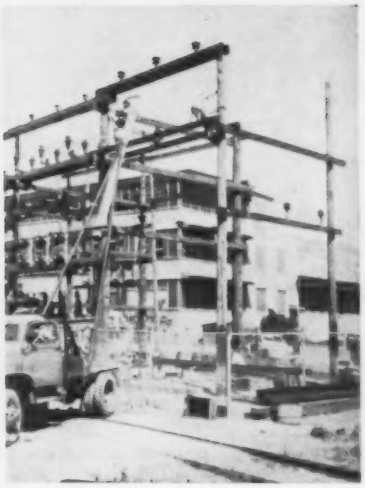
Construction expenditures in 1956 for transmission and distribution capacity and normal system improvements will amount to $10,000,000. The 1956 expenditures for these items are slightly higher than the corresponding expenditures for 1955.

In 1955, the company expanded its hydro generating capacity by constructing a 60,000-acre-ft storage reservoir at Timothy Meadows on the Oak Grove Fork of the Clackamas River. This storage reservoir will supplement normal stream flow during the low water season at station P on the Oak Grove Fork and at stations G and M on the main stem of the Clackamas River.

In 1955 the company built a service center on Southwest 17th Avenue for its Portland operating division at a cost of $1,450,000. This new service center provides headquarter facilities for general stores, Portland line and distribution departments and the company's power and distribution transformer shops.

The 1955 November system peak was 741,000 kw as compared with 627,000 kw for December 1954. The cold weather experienced during No-

Ultramodern Ogden office building was completed in 1955 by Utah Power & Light Co.



Nephi sub addition for Telluride Power Co.

vember 1955 had a marked effect on the company's electric heating load and was a major factor in creating the 1955 November peak.

In 1956 the company will increase its interconnection capacity with BPA in the Portland area by building a 115-kv 795-MCM ACSR transmission line from BPA's new Keeler substation to station E and by installing a 62,500-kva 115/11-kv step-down transformer bank at station E. In the Salem area the interconnection capacity will be increased by building a second 57-kv 795-MCM ACSR line from BPA's Chemawa substation for reinforcing the distribution system in the Salem area.

The company's new distribution substation transformer additions for 1956 will total 67,000 kva.

It is of interest to point out that the program started 10 years ago for increasing the distribution voltage in all areas outside of Portland and Salem to 12.5 kv is now near completion. Associated with the program for raising distribution voltage to 12.5 kv was a decision to eliminate 24 kv as a subtransmission voltage. This latter program is also nearing completion.

Street-Lighting Program

During 1955 the company proceeded with the installation of the new street-lighting program which was authorized by the voters in November 1954 election and became effective on July 1, 1955. One thousand two hundred ninety-seven new 20,000-lumen mercury lamps were installed on main arterial streets in 1955. This street-lighting program will be very actively continued in 1956.

For expanding its own hydro generating capacity, the company expects to start construction on the following plants in 1956:

Plant	River	Capability
Pelton	Deschutes	120,000 Kw
*North Fork	Clackamas	53,000 Kw
*Station "G" Additions	Clackamas	25,000 Kw
		198,000 Kw

*Applications for licenses have been filed.

Estimated cost of the above projects is $44,000,000.

In addition, the company in partnership with the Pacific Power & Light Co., Washington Water Power Co. and Montana Power Co. expects to start construction in 1956 on Mountain Sheep and Pleasant Valley projects on the Middle Snake which will have a combined capacity of 1,183,000 kw. Application for license for these projects has been filed with the Federal Power Commission. — *John Bankus, chief engineer.*

Utah

Provo River Project, USBR

Another power feature for which initial construction funds were made available during 1955 is the 2-unit, 5,000-kw Deer Creek power plant and switchyard. The structure, which will be constructed at Deer Creek Dam on the Provo River near Provo, Utah, was placed under contract late in the year, with initial operation expected by summer of 1957. Authorization was requested early in 1955 by the Provo River Water Users' Assn., whose 1936 repayment contract contained an option under which the association could build the plant itself or request construction by the federal government.

Telluride Power

In 1955, $375,000 were spent for betterments; budgeted for 1956 are $250,000. During the year past, a total of 117 miles of 44-kv line and 20 miles of 2,400- and 7,200-v lines was built. Distribution substation capacity added equaled 3,700 kva.

For 1956 there are planned 15 miles of 44-kv line and 30 miles of 2.4-, 5- and 7.2-kv lines. Substation capacity will be increased by 1,000 kva.

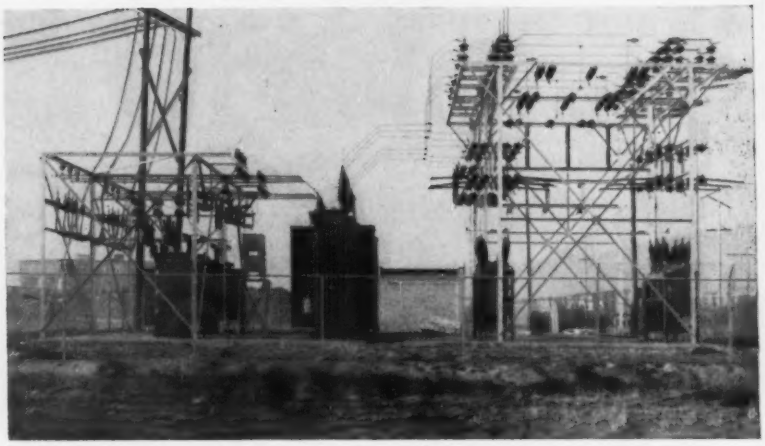
System peak for 1955 was 19,429 kw as compared with 18,483 kw for 1954, an increase of 5.1%.—*Orrice C. McShane, general manager.*

Utah Power & Light

Electricity consumers in the area served by Utah Power & Light Co. used more energy in 1955 than any other year in history.

To meet these demands, the utility, which serves 178,000 customers in Utah, Idaho and Wyoming, spent $15,728,000 during the year on new and improved electric generating and service facilities. The year's expenditures brought to $125,000,000 the amount the company has spent in the past 10 years to build up power resources. More expansion is programmed for the next two years.

Energy input to the system in 1955 reached 2½ billion kilowatt-hours—an increase of one-third billion kilowatt-hours over 1954. The increase was credited to added use of electrical appliances in homes (average Utah Power & Light residential usage climbed above 3,800 kwh in 1955); a growing trend toward industrialization in an area whose basic economy a few years ago was mining and agricul-



Welded aluminum structure, Clark County PUD; new 20,000-kva sub for Weyerhaeuser Timber Co. at Longview, Cowlitz County PUD

ture; growing use of electrical well pumping for irrigation, notably in Idaho's upper Snake River Valley.

Largest items in the 1955 construction program are: completion of a 100,000-kw third unit at the Gadsby plant in west Salt Lake City that raised the total generating capability of the utility to 580,300 kw; construction of a $450,000 office building in Ogden, Utah; construction of 112 miles of 138-kv line from Helper, Utah, to Moab, Utah, and 61 miles of 69-kv line to Monticello, Utah, to serve the growing uranium mine and milling loads on the Colorado plateau in southeastern Utah; installation of microwave communication facilities linking system dispatchers to all major generating stations, substations and interconnected companies; installation of load control equipment providing automatic regulation of nine Utah Power & Light generating units with a combined capacity of 430,000 kw; construction of a 31-mile line and substations in upper Snake River Valley, costing $1,152,000, to serve growing irrigation and residential loads.

In addition, the company added to and improved transmission and distribution facilities throughout the system.

In the field of atomic energy, Utah Power & Light Co. continues, as a member of the Rocky Mountain Nuclear Power Study Group, a program of study toward the feasible and economic development of the atom to produce electricity. One of the most significant happenings on the local as well as international scene, was history's first use of atomic energy to produce the sole source of light and power, on July 17, for an American town—Arco, Idaho—a project in which Utah Power & Light Co. personnel and facilities participated.

Utah Power will spend an estimated $38,000,000 during 1956-57 to keep ahead of the area's growing power needs—$18,000,000 of which have been budgeted for this year.

Major expenditures scheduled for 1956 are: begin construction of a 100,000-kw steam-electric plant to be completed in 1957, site of which is still under study; $3,300,000 for transmission line and substation construction; $5,500,000 for distribution extensions to new customers and improvement of existing facilities including additional substation capacity.

Washington

Chelan County PUD

For 1956 $578,659 have been budgeted, $572,727 of which are for distribution facilities and $5,932 for production. Last year total expenditure was $1,413,347. Principal items were construction of a 20,000-kva substation, 19 miles of transmission and eight miles of distribution lines.

Last year's peak was 43,000 kw as compared with 34,549 kw for 1954, an increase of 24.5%.

Application for FPC license to construct the Rocky Reach hydro project has been filed. Studies have shown exceptionally favorable rock conditions at the site. Seven generating units of 90,000 kw each are to be installed with several but not all scheduled for completion in the fall of 1962. Estimated cost of this project is $250,000,000.

Preliminary investigation is continuing on the Wenatchee hydro project, FPC project No. 2151. Core drilling is progressing at the dam site in Tumwater Canyon. Capacity will be 145,000 kw, scheduled for the fall of 1959.

Chief Joseph Dam Army Engineers

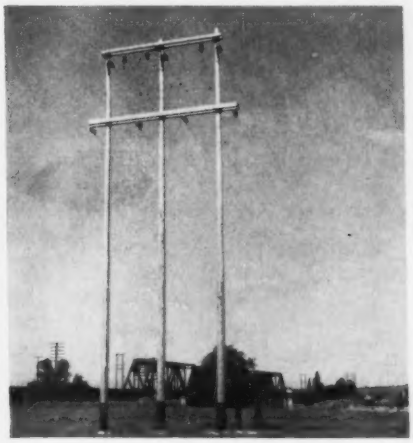
The main dam and the intake structure at Chief Joseph Dam on the Columbia River, Wash., were completed last spring. The first three generating units in the power house began production officially on August 20, 1955. The fourth 64,000-kw unit was placed on the line officially on Nov. 16, 14 days ahead of construction schedule. One additional unit is slated to go on the line each three months until the initial component of 16 turbines and generators is in production before the end of 1958. Power equipment ultimately will be 27 units, dependent upon development of additional upstream storage. The project's total rated capacity then will be 1,728,000 kw.

Construction was completed in 1955 on the power house structure to the intermediate lengths: substructure, 1,546 ft, adequate for 20 units; superstructure, 1,336 feet, adequate for the first 17 units. The intake structure was completed to the full ultimate length for 27 units, 2,036 ft. Installation of the first 16 penstocks was completed, the tubes painted and elbows encased. The first two banks of three transformers each were installed and the seventh transformer received at the project.

Estimated investment for this project with the first 16 power units in production has been $169,000,000.

Clark County PUD

The system peak load increased from 86,000 kw during the winter of 1954-55 to a peak of 102,000 kw in November of 1955. New loads and increase of existing loads necessitated the addition of 11,000 kva in distribution transformer capacity. Approximately



Arlington-Stanwood line. Snohomish PUD

1,000 new services were run and 1,600 poles were set.

A new substation, approximately six miles north of Vancouver, was put in service. The structure as well as the bus work are entirely made of aluminum. All members were welded together, as much as possible of this work was done on a flat surface on the ground, and afterwards hoisted into position. This required a minimum of welding in the air. Bus connections and supports were also welded.

Approximately 13 miles of heavy 12.45/7.2-kv feeders were constructed.

Plans for 1956 stipulate the construction of 12 miles of 12.45/7.2-kv feeders, the building of a six-feeder switching station and the installation of more automatic sectionalizing equipment. Conversions from 2.4 kv to 12.45/7.2 kv will continue as the loads and line regulations warrant it. —*Fred H. Lehman, chief engineer.*

Cowlitz County PUD

During 1955 the district continued with its program of distribution system improvement and extension including conversion to 2.4/4.1 kv and 7.2/14.5 kv, pole replacement and the installation of larger conductor. The entire distribution system in the town of Ryderwood was rebuilt and converted to 4,160 v including an entirely new street lighting system. Certain additional feeder areas in Kelso and Longview were converted to higher distribution voltage with the over-all result that nearly all distribution is now at the higher level of voltage with 7.2/14.5 kv predominating. New, high-intensity street lighting was installed on Broadway and around the Civic Center in the city of Longview.

One new 20,000-kva substation was erected and placed in operation to provide power service to the Weyerhaeuser Timber Co. pulp division in Longview.

Generating plant changes and improvements were not extensive since the plant does not operate except on an emergency basis. Installation of one closed-type generator cooler was made, which equips all units with closed coolers.

The 60-kv transmission loop around the Kelso-Longview area was completed with the installation of 1.1 miles of line in Longview terminating at 3rd and Ferry Street where the first portion of a 69-kv switching station was also installed.

Costwise, total distribution improvements and extensions approximated $614,000, transmission $41,000, production $4,600, equipment and transportation $29,000, and general, including land and structures, $39,000.

During 1956 the district's construction program will be largely directed toward increasing the number and capacity of distribution substations and feeders by the installation of additional substation transformers, additional or larger feeders and at least two new distribution substations. A certain amount of increase in feeder capacity will come from conversion to higher voltage but for the most part additional facilities are required. It is now proposed that 22,500 kva of additional substation capacity will be installed, approximately 20 line miles of additional distribution system and 6 miles of 69-kv transmission line. The total amount to be expended for over-all system expansion and improvement will approximate $1,000,000.—*O. G. Hittle, manager.*

Ice Harbor Dam Army Engineers

Ice Harbor Lock and Dam is the farthest downstream of four authorized multiple-purpose dams to provide slackwater navigation, hydroelectric power and other beneficial water-use development on the lower Snake River. The dam will be a concrete-gravity-type structure, about 2,790 ft long and 100 ft in effective height. Included will be a single-lift navigation lock. a power house, a gated spillway section and fish passage facilities. Power installation will consist of three 90,000-kw generating units initially and six units ultimately, with a final capacity of 540,000 kw. The current estimated cost of the total project is $135,000,000. Expenditures during 1955 have been approximately $420,000.

Preconstruction planning is completed for the first year's construction program. A contract was awarded to construct access roads, and acquisition of lands is under way. Construction bids are proposed to be advertised for the first-step cofferdam. Supply contracts will be awarded for furnishing three 143,000-hp turbines and the steel sheet piling for cofferdam construction.

Pacific Northwest Power Co.

Pacific Northwest Power Co. completed five months of extensive diamond-drill exploration at two Snake River hydro sites in May and other preliminary engineering work during the summer. FPC had granted the generating company a preliminary permit April 8. The company filed its license application Sept. 7.

The Pleasant Valley development, with an initial capacity of 720,000 kw and ultimate capability of 1,014,000 kw, will have a 534-ft-high arch dam, the third highest of its kind in the world. The development at Mountain Sheep, 20 miles downstream, calls for a dam 255 ft high with an initial capacity of 282,000 kw and ultimate capability of 432,000 kw. Turbines and generations will be the largest ever built.

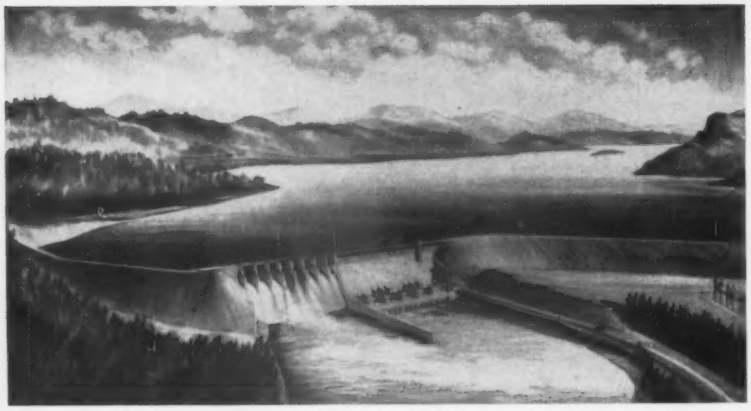
Pleasant Valley will back water 34 miles to the Hells Canyon site. The reservoir will cover 6,000 acres and have a total storage capacity of 928,000 acre-ft with about 500,000 acre-ft usable for flood control and downstream power benefits.

Initial capability of both plants will be 1,183,000 kw from eight units with an ultimate capability of 1,446,000 kw from 10 units. Annual firm load-carrying ability will be increased by about 5,140,000,000 kwh. If it is possible to start construction in 1956, it will be possible to bring in the initial capacity of 1,183,000 kw for the two plants in 1959.

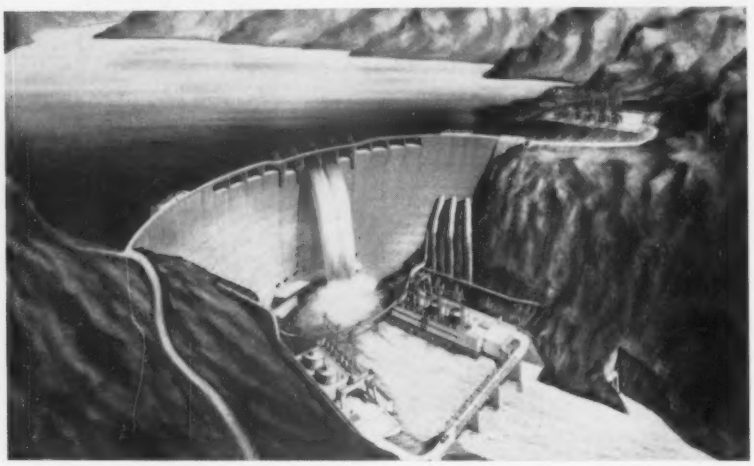
The project will rank next to Grand Coulee as the largest hydro development in the Northwest. It is three times the size of Bonneville and 28% bigger than McNary.

Following license application, other items relative to development of the project continued to move forward. They include a joint study of the effects of the Snake River dams on fish and wildlife, being carried on by the fish and game commissions of Oregon, Idaho and Washington, and the U. S. Fish and Wildlife Service, with the company providing necessary funds. Both developments were planned above the mouths of the Salmon and Imnaha Rivers in order not to interfere with important fish migrations. PNP also arranged for a survey of mineralization as well as archeological occurrences in the project area.

Pacific Northwest Power Co. is a corporation formed by Washington



Conception of completed Noxon Rapids hydro development of Washington Water Power



Pleasant Valley development on Snake River as envisioned by Pacific Northwest Power Co.

Water Power Co., Montana Power Co., Portland General Electric Co. and Pacific Power & Light Co. for the purpose of power development. Kinsey M. Robinson, president of Washington Water Power Co., is president of PNP.

Puget Sound Power & Light

During the year 1955 preliminary engineering and investigation work was started and an application for a license filed with the Federal Power Commission for an 85,000-kw hydroelectric project on the Upper Baker River. Engineering work was started in connection with the addition of a third unit of 55,000 kw at the present Lower Baker hydroelectric plant. Also, plans were completed for the installation of a 20,000-kw hydroelectric generating unit in power house No. 2 at Snoqualmie Falls.

Based on a comprehensive economic survey and appraisal of all relevant factors made for the company by a nationally known firm of management consultants, it was decided to relocate the general office and central division functions, now located in the Electric Building in Seattle, to new locations in the rapidly growing area served by Puget east of Lake Washington. A new building is to be constructed at Bellevue for the general office and the Bellevue local office, a second building near Kirkland is being constructed for the company's system load dispatching and communications departments and a third building has been started at Renton to house the central division office and operating personnel. Present estimates indicate that the total cost of these new buildings will be about $2,000,000.

During 1955 a new transmission substation and 23 miles of 110-kv transmission line were constructed at March Point near Anacortes to provide additional capacity in this rapidly growing area. Present capacity of this station is 40,000 kva, 110/55 kv, with provisions to double its capacity when load growth justifies the increase. Eleven new distribution substations with a combined capacity of 45,000 kva were constructed and placed in operation during the year. Transformer capacity in 15 existing distribution substations was increased a total of 38,500 kva during 1955. Net additions of transformer capacity during the year were 83,500 kva.

Total plant expenditures for the year were $9,650,000 of which $430,000 were for production plant improvements, $1,000,000 were for transmission plant, $7,345,000 were for distribution plant, including expenditures required to serve new customers and $875,000 were for general plant additions and replacements.

In 1956 Puget plans to start the construction of the Upper Baker Dam and reservoir with completion of the power house and installation of hydraulic and electrical equipment to be made in 1959. Work will also be started on the 20,000-kw addition at Snoqualmie Falls with completion scheduled during the summer of 1957.

It is planned that the three new office buildings started during 1955 will be completed and occupied by the fall of 1956.

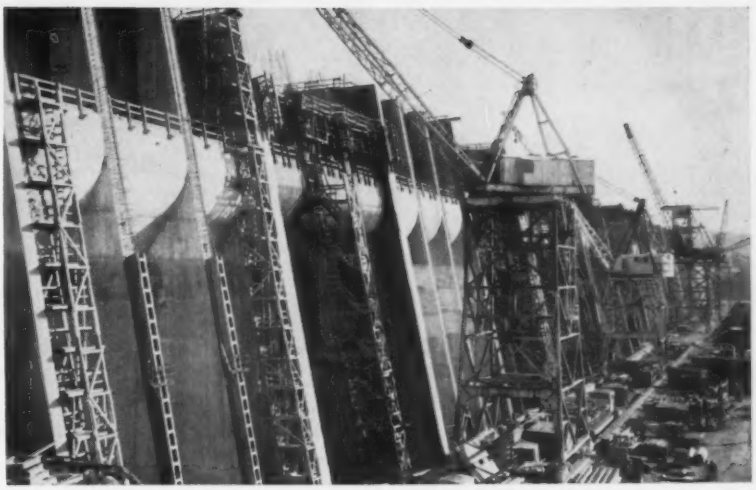
In addition to the above, Puget plans to construct about 20 miles of transmission line and add 85,000 kva of 110/55-kv transformer capacity to existing transmission substations. Twenty-one new distribution substations with a total capacity of 79,000 kva will be constructed and the capacity of 13 existing substations will be increased by a total of 28,500 kva.

Total plant expenditures for the year 1956 are estimated at $20,000,000, of which $4,700,000 will be for production plant improvements, $1,750,000 for transmission plant, $10,950,000 will be for distribution plant including expenditures to serve new customers, and $2,600,000 will be for general plant improvements, including the three new office buildings, and two new operating department and store buildings, one at Puyallup and one at Burlington.—*Frank McLaughlin, president.*

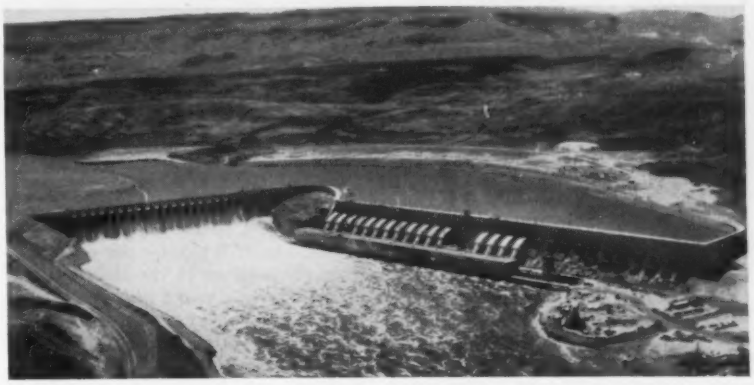
Seattle City Light

During the year 1955 total expenditures for additions to electric plant amounted to $14,650,000. Improvements and additions to facilities at Ross and Diablo power plants, beginning installation of the fourth generating unit at Ross and preparatory work to construct the new Gorge Dam and Gorge-Diablo highway accounted for a total expenditure of $7,950,000. Other expenditures for the year were $950,000 for transmission plant, $5,300,000 for distribution plant and $450,000 for general plant.

The contract for installation of the fourth generating unit at Ross power house and miscellaneous improvements to Ross and Diablo facilities was awarded to West Coast Construction Co. Inc. during May 1955. The 90,000-kw unit is scheduled to be in service for the 1956 winter peak load. Other work being done under this contract includes a tennis court at Diablo, modifications to the Diablo Tailrace bridge and incline car lift, removal of existing bridge and construction of a new steel bridge at the Windy Cut site near Diablo Dam, reconstruction of car barge and landing at Diablo and Ross, placing topsoil in Ross power house area and construction of an access road from Ross power house to the top of Ross Dam.



Construction work on intakes to the turbines at The Dalles power house. Army Engineers



Chief Joseph Dam where the Army Engineers are installing initially 16 64,000-kw units

Dam Construction Started

Merritt-Chapman & Scott Corp. of New York City and the Savin Construction Corp. of East Hartford, Conn., started construction on our new dam at the intake of the existing Gorge power plant and also the highway from the Gorge plant to Diablo. The new concrete arch and gravity dam will replace our existing diversion dam, and will increase the head from 292 ft to 380 ft with the resulting increase of 47,000 kw from the Gorge plant. The dam is scheduled for completion during 1958 and the highway during the latter part of 1956.

The new Duwamish receiving substation was completed this year and energized Oct. 1, 1955. Its initial installed capacity is 150,000 kva. The station is located in the south end of the service area on the west bank of the Duwamish River.

A 230-kv double-circuit, combination steel tower and wood pole transmission line, 2.4 miles long, was constructed to connect Duwamish substation with our existing 230-kv transmission system. Also constructed were 7.5 miles of double-circuit 115-kv steel tower line from Bothell substation to the north King County line and 3 miles of 115-kv line on wood poles. Approximately 19 circuit miles of 26-kv line were constructed with the major portion being in the south service area feeding distribution substations from Duwamish receiving substation.

A total of 54,000 kva of distribution substation capacity was installed during the year, along with a nominal amount of primary and secondary distribution circuits.

1956 Program

Plans for the expansion of plant in 1956 call for payments for the fourth unit turbine and generator at Ross power house and their installation. The improvements and additions to service facilities at Ross and Diablo will continue until mid-1956. Construction of the Gorge concrete dam will continue as scheduled, with the gravity spillway section and outlet works being constructed first. Other hydro plant expenditures will be for Gorge power house modernization, miscellaneous improvements to general facilities, possible improvements at Cedar Falls and preliminary studies of future projects. The construction of the Gorge-Diablo highway, to replace the existing roadway which will be flooded after completion of the dam, will continue as scheduled. Estimated expenditures for this construction are $9,900,000.

Extensions to the transmission system will include approximately 14.1 miles of 115-kv circuits on wood poles and 20 miles of 26-kv circuits. Additions to transmission substations will be a fourth transformer bank rated at 90,000 kva, with allied equipment, and two 40-mvar capacitor banks at our Bothell substation. These transmission facilities are estimated to require an expenditure of $2,100,000.

Additions to distribution plant will amount to a total of $6,400,000. This amount will be expended for new distribution substations, additions and modifications to existing substations, a new underground system for the north Metropolitan district to be served from Broad Street substation and for new distribution lines and services. New distribution substation capacity is estimated at 107,000 kva.

General plant additions will be a new warehouse, shop and yard facilities at North 100th Street and Ashworth Avenue. Bids are expected to be called for during June of 1956. Other items are a possible addition to the City Light building and miscellaneous items relative to other facilities. Estimated expenditures for general plant are $1,825.000.

This entire program will call for a total expenditure of $20,229,000 during 1956.—*H. V. Strandberg, chief engineer.*

Turbine casting for Ross, Seattle City Light

Aerial view of construction by Tacoma City Light at Mayfield dam site on Cowlitz River

Snohomish County PUD

Business conditions continued an upward trend in Snohomish County and Camano Island in the year 1955, the district has continued its long-range program of advance planning and construction making large investments to keep pace with the increased demands for electric power. Capital expenditures in 1955 totaled $2,375,000. The amount budgeted for 1956 is $3,771,880.

The district completed construction of a 5,000-kva 55/12-kv substation near East Stanwood and built approximately 12 miles of 55-kv transmission line to serve the new substation from the East Arlington 110-kv bus. Work was completed in the general service headquarters buildings, the open house being held Oct. 6, 1955. Construction of the administration building will start in the spring of 1956. This will complete a planned all-electric center.

Construction was started on a 55-kv line from Arlington to Darrington. Completion is expected in 1956 along with the 5,000-kva 55/12-kv substation to be built in the Darrington area. A start was also made on a 5,000-kva 55/4-kv substation in the Mountlake Terrace area.

In addition to the items mentioned, the following major improvements are budgeted for 1956: a substation in Everett with a 30,000-kva 110/55-kv transformation and a 110-kv tap line from the Snohomish-Everett 110-kv line to the substation. This will serve the fast growing industrial load in the Everett area; a 55- and 12-kv line is planned from Snohomish and Monroe and a 12-kv line from Monroe and Sultan. To keep up with the growth in the Lynnwood area, a 7,500-kva 55/12-kv substation will be constructed. In the same area the Alderwood Manor substation and distribution system will be converted from 4 kv to 12 kv.

The system peak for 1955 was 169,038 kw compared with the peak of 130,079 for the year 1954.—*A. S. J. Steele, manager.*

Tacoma City Light

Legal blockades to impede construction on the Cowlitz River by the city of Tacoma still plague the city. Litigation brought on by the State Departments of Game and Fisheries is pending in the Superior Court of Thurston County. In spite of these difficulties, construction progresses at the Mayfield site. The contractor, Arundel & Dixon, arrived on the site early in July with earth-moving equipment, air compressors and drills. A recent arrival is the rock-boring monster, a Tunnel Jumbo drill, which has gone to work on the main power tunnel.

The power load continues to grow. A 10% increase over the 1954 requirements is evidenced in the first 11 months. Of the total requirements, the 55% which is labeled purchase and exchange shows a net increase of 29%, indicating that Tacoma is greatly in need of the additional generation now going to waste down the Cowlitz River. Not only is it needed to supply the load but also to maintain Tacoma's economic status.

A recent cold wave of one-week duration is accountable for an 11% increase over anticipated requirements. Energy for the week exceeded slightly the estimate for the coldest week in January 1956. A 30,000-kw increase over the normal early morning demand, which occurred on the coldest day, is likely due to space heating.

Estimated capital expenditures for the year 1956, exclusive of the major hydro projects, will go largely into distribution system improvement and expansion. Of the $1,900,000 earmarked for that purpose, 20% is labeled for substations. Ten per cent of the construction budget is allocated to general plant, 5% to transmission plant and the remainder, excluding the distribution system figure, to hydro plant.

Participating as a member of the Puget Sound Utilities Council, Tacoma has entered into agreement with the Atomic Energy Commission for study in connection with the application of nuclear energy for development of electric power. The main objective of the council is to provide adequate electrical energy for the Puget Sound area.

Announcing that another milestone has been reached, we close the year with a report of having exceeded for the first time the two-billion mark in annual kilowatt-hour production.—*H. A. Cole, superintendent, light division.*

Washington Water Power

More than $22,500,000 have been budgeted by the Washington Water Power Co. for construction in 1956 as compared with capital expenditure of $8,122,000 during 1955. Biggest money item on the construction schedule is $16,022,177 for hydro plant construction and improvement, of which $15,710,185 are slated for WWP's Noxon Rapids hydroelectric dam in western Montana. More than $3,700,000 have already been spent on the 400,000-kw project. When work is completed on the mile-long Noxon Dam in 1960, the company's investment in the project is expected to reach $85,000,000. When in full operation, the Noxon plant will be the utility's largest generating station and double WWP's power production capability.

Approximately $4,000,000 will also

Calendar of New Generation

1955—Completed

Date	Size—Kw	Plant	Agency
Feb.	70,000 (H)	McNary	Army Eng.
Feb.	40,000 (H)	Lookout Point	Army Eng.
March	14,200 (H)	Albeni Falls	Army Eng.
April	40,000 (H)	Lookout Point	Army Eng.
April	40,000 (S)	Broadway	Pasadena L&P Dept.
May	6,150 (H)	Nimbus	USBR
May	54,000 (H)	Folsom	USBR
May	15,000 (H)	Dexter	Army Eng.
May	14,200 (H)	Albeni Falls	Army Eng.
May	70,000 (H)	McNary	Army Eng.
May	175,000 (S)	El Segundo	So. Calif. Edison
June	6,750 (H)	Nimbus	USBR
June	100,000 (S)	Gadsby	Utah P&L
July	36,000 (H)	Alcova	USBR
July	29,000 (H)	Lemolo No. 1	Calif. Oregon Power
Summer	100,000 (S)	Saguaro	Arizona PS
Aug.	14,200 (H)	Albeni Falls	Army Eng.
Aug.	192,000 (H)	Chief Joseph	Army Eng.
Aug.	70,000 (H)	McNary	Army Eng.
Sept.	16,500 (S)	W. N. Clark	So. Colo. Power
Sept.	112,500 (S)	Arapahoe	PS of Colorado
Oct.	70,000 (H)	McNary	Army Eng.
Oct.	54,000 (H)	Folsom	USBR
Oct.	165,000 (S)	Morro Bay	PG and E
Oct.	95,000 (H)	Pit 4	PG and E
Oct.	40,000 (S)	Highgrove	Calif. Elec. Power
Nov.	64,000 (H)	Chief Joseph	Army Eng.
Dec.	156,250 (S)	Valley	L.A. Dept. of W&P
Dec.	54,000 (H)	Folsom	USBR
Dec.	44,000 (S)	Clark	So. Nevada Power
Total	**1,958,350 kw**	**(S) 949,250 kw**	**(H) 1,009,100 kw**

1956—Planned

Date	Size—Kw	Plant	Agency
Jan.	12,000 (H)	Chandler	USBR
Jan.	22,000 (S)	George Birdsall	Colo. Springs PU Dept.
March	156,250 (S)	Valley	L.A. Dept. of W&P
March	64,000 (H)	Chief Joseph	Army Eng.
April	70,000 (H)	McNary	Army Eng.
June	64,000 (H)	Chief Joseph	Army Eng.
June	70,000 (H)	McNary	Army Eng.
July	42,000 (H)	Seaton Creek	B.C. Elec.
Summer	33,000 (H)	Lemolo No. 2	Calif. Oregon Power
Summer	165,000 (S)	Morro Bay	PG and E
Aug.	100,000 (S)	Encina	San Diego G&E
Sept.	16,500 (S)	W. N. Clark	So. Colo. Power
Sept.	165,000 (S)	El Segundo	So. Calif. Edison
Sept.	70,000 (H)	McNary	Army Eng.
Sept.	64,000 (H)	Chief Joseph	Army Eng.
Autumn	50,000 (S)	Humboldt Bay	PG and E
Oct.	28,500 (S)	Palisades	USBR
Nov.	3,200 (H)	Pleasant Valley	L.A. Dept. of W&P
Nov.	165,000 (S)	Alamitos	So. Calif. Edison
Nov.	10,000 (H)	Portal	So. Calif. Edison
Dec.	90,000 (H)	Ross	Seattle Lighting Dept.
Dec.	33,000 (H)	Pilot Knob	Imperial Irrig. Dist.
Dec.	64,000 (H)	Chief Joseph	Army Eng.
Total	**1,535,450 kw**	**(S) 846,250 kw**	**(H) 689,200 kw**

1957—Planned

Date	Size—Kw	Plant	Agency
Jan.	40,000 (S)	Broadway	Pasadena L&P Dept.
March	64,000 (H)	Chief Joseph	Army Eng.
March	28,500 (H)	Palisades	USBR
April	20,000 (H)	Snoqualmie	Puget Sound P&L
April	100,000 (S)	Agua Fria	Salt River Power Dist.
Spring	60,000 (S)	Clark	So. Nevada Power
May	44,000 (S)	El Centro	Imperial Irrig. Dist.
June	64,000 (H)	Chief Joseph	Army Eng.
June	28,500 (H)	Palisades	USBR
July	60,000 (S)	San Bernardino	Calif. Elec. Power
Summer	100,000 (S)	Cherokee	PS of Colorado
Summer	100,000 (S)	(Unnamed)	Utah P&L
Summer	70,000 (H)	Cheakamus	B.C. Elec.
Sept.	165,000 (S)	Redondo	So. Calif. Edison
Fall	70,000 (H)	Cheakamus	B.C. Elec.
Fall	30,000 (H)	Project X	B.C. Elec.
Fall	25,000 (H)	Faraday	Portland GE
Fall	60,000 (H)	H. H. Cochrane	Montana Power
Sept.	64,000 (H)	Chief Joseph	Army Eng.
Sept.	28,500 (H)	Palisades	USBR
Sept.	165,000 (S)	Alamitos	So. Calif. Edison
Oct.	50,000 (S)	Richards Street	Hawaiian Elec.
Nov.	64,000 (H)	Chief Joseph	Army Eng.
Nov.	156,000 (H)	The Dalles	Army Eng.
Winter	22,000 (S)	Cameo	PS of Colorado
	33,000 (S)	Person	PS of N.M.
Total	**1,661,500 kw**	**(S) 939,000 kw**	**(H) 772,500 kw**

1958—Planned

Date	Size—Kw	Plant	Agency
Feb.	78,000 (H)	The Dalles	Army Eng.
Feb.	64,000 (H)	Chief Joseph	Army Eng.
Spring	120,000 (H)	Pelton	Portland GE
Spring	53,000 (H)	North Fork	Portland GE
April	100,000 (S)	Agua Fria	Salt River Power Dist.
April	4,000 (H)	Gateway	USBR
April	2,000 (H)	Tiber	USBR

1958—Planned—Continued

Date	Size—KW	Plant	Agency
April	1,400 (H)	Wanship	USBR
May	75,000 (S)	Tucson	Tucson GEL&P
May	11,250 (H)	Roza	USBR
May	12,000 (H)	Glendo	USBR
May	78,000 (H)	The Dalles	Army Eng.
May	64,000 (H)	Chief Joseph	Army Eng.
June	200,000 (S)	(Unnamed)	So. Calif. Edison
June	12,000 (H)	Glendo	USBR
June	6,250 (H)	Deer Creek	USBR
July	22,000 (S)	W. N. Clark	So. Colo. Power
July	100,000 (S)	Encina	San Diego G&E
July	60,000 (S)	San Bernardino	Calif. Elec. Power
July	22,000 (S)	W. N. Clark	So. Colo. Power
July-Oct.	80,000 (H)	Mayfield	Tacoma PU Dept.
Summer	106,000 (H)	Poe	PG and E
Summer	165,000 (S)	Station P	PG and E
Aug.	78,000 (H)	The Dalles	Army Eng.
Aug.	64,000 (H)	Chief Joseph	Army Eng.
Sept.	156,250 (S)	Scattergood	L.A. Dept. of W&P
Fall	75,000 (H)	Project Y	B.C. Elec.
Fall	100,000 (S)	Wyoming	Pacific P&L
Fall	265,000 (H)	Swift	Pacific P&L
Fall	30,000 (H)	Beaver Marsh	Eugene Water Board
Fall	360,000 (H)	Brownlee	Idaho Power
Nov.	78,000 (H)	The Dalles	Army Eng.
Nov.	64,000 (H)	Chief Joseph	Army Eng.
Dec.	200,000 (S)	(Unnamed)	So. Calif. Edison
Dec.	47,000 (H)	Gorge	Seattle Lighting Dept.
Dec.	44,000 (S)	Burbank	Burbank PS Dept.
Winter	151,000 (H)	Brownlee	Idaho Power
Total	**3,148,150 kw**	**(S) 1,244,250 kw**	**(H) 1,903,900 kw**

1959—Planned

Date	Size—Kw	Plant	Agency
Jan.-April	80,000 (H)	Mayfield	Tacoma PU Dept.
Feb.	78,000 (H)	The Dalles	Army Eng.
March	94,000 (H)	Mountain Sheep	Pacific NW Power
May	100,000 (S)	Octillo	Arizona PS
May	78,000 (H)	The Dalles	Army Eng.
May	94,000 (H)	Mountain Sheep	Pacific NW Power
June	4,500 (H)	Big Thompson	USBR
June	104,500 (H)	Hoover No. 8	USBR
Summer	100,000 (S)	Cherokee	PS of Colorado
July	94,000 (H)	Mountain Sheep	Pacific NW Power
Aug.	78,000 (H)	The Dalles	Army Eng.
Sept.	85,000 (H)	Upper Baker	Puget Sound P&L
Sept.	100,000 (H)	Noxon Rapids	Washington Water Power
Sept.	40,000 (S)	Glendale	Glendale PS Dept.
Fall	1,200,000 (H)	Project Z	B.C. Elec.
Fall	80,000 (H)	Big Bend	Calif. Oregon Power
Oct.	156,250 (S)	Scattergood	L. A. Dept. of W&P
Nov.	78,000 (H)	The Dalles	Army Eng.
Dec.	100,000 (H)	Noxon Rapids	Washington Water Power
	141,300 (H)	Wenatchee	Chelan County PUD
	42,500 (H)	Jaybird	Sacramento MUD
	33,000 (S)	South Plant	Colo. Springs PU Dept.
Total	**2,961,050 kw**	**(S) 429,250 kw**	**(H) 2,531,800 kw**

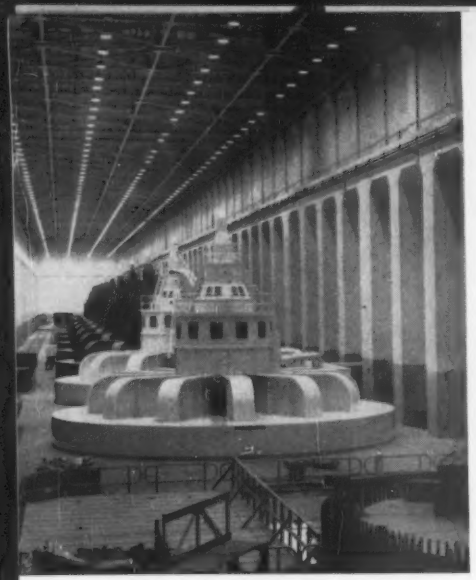
1960—Planned

Date	Size—Kw	Plant	Agency
Feb.	78,000 (H)	The Dalles	Army Eng.
March	100,000 (H)	Noxon Rapids	Washington Water Power
April	50,000 (H)	Yellowtail	USBR
May	100,000 (S)	Octillo	Arizona PS
May	24,000 (H)	Fremont Canyon	USBR
May	78,000 (H)	The Dalles	Army Eng.
May	600,000 (H)	Priest Rapids	Grant County PUD
June	24,000 (H)	Fremont Canyon	USBR
June	100,000 (H)	Noxon Rapids	Washington Water Power
July	4,600 (H)	Upper Molina	USBR
July	50,000 (H)	Yellowtail	USBR
July	432,000 (H)	Pleasant Valley	Pacific NW Power
Aug.	78,000 (H)	The Dalles	Army Eng.
Aug.	144,000 (H)	Pleasant Valley	Pacific NW Power
Sept.	144,000 (H)	Pleasant Valley	Pacific NW Power
Sept.	55,000 (H)	Lower Baker	Puget Sound P&L
Fall	60,000 (H)	Project Z	B.C. Elec.
Oct.	50,000 (H)	Yellowtail	USBR
Nov.	25,000 (H)	Cougar	Eugene Water Board
Nov.	78,000 (H)	The Dalles	Army Eng.
	44,000 (S)	(Unnamed)	PS of N.M.
	42,500 (H)	Jaybird	Sacramento MUD
Total	**2,361,100 kw**	**(S) 144,000 kw**	**(H) 2,217,100 kw**

1961—Planned

Date	Size—Kw	Plant	Agency
Jan.	50,000 (H)	Yellowtail	USBR
May	75,000 (S)	Tucson	Tucson GEL&P
July	4,600 (H)	Lower Molina	USBR
July	60,000 (S)	San Bernardino	Calif. Elec. Power
July	33,000 (S)	(Unnamed)	So. Colo. Power
Summer	100,000 (S)	(Unnamed)	PS of Colorado
Fall	60,000 (H)	Project Z	B.C. Elec.
Oct.	75,000 (H)	Mossyrock	Tacoma PU Dept.
Oct.	60,000 (S)	Glenarm	Pasadena L&P Dept.
Nov.	30,000 (H)	Hills Creel	Army Eng.
Dec.	270,000 (H)	Ice Harbor	Army Eng.
	18,000 (H)	Union Valley	Sacramento MUD
	57,000 (H)	Camino	Sacramento MUD
Total	**892,600 kw**	**(S) 328,000 kw**	**(H) 564,600 kw**

(H) Hydro (S) Steam * From storage. † Approximate.



McNary power house. Army Engineers

be spent in 1956 in regular expansion and modernization of its electric service network throughout the Inland Empire. Another $2,200,000, of which more than $1,750,000 are ticketed for the company's new Ross Park service center in Spokane, will be spent for general plant improvement.

For new substations and improvements, more than $1,000,000 will be spent during 1956. Completely new substations will be constructed at Wilbur, Othello and Kettle Falls in Washington and at Bovill and Lakeview, Idaho. Equipment will be replaced, expanded or modernized at approximately 19 more substations on the company's two-state system.

Among the other major construction projects to be undertaken is the building of a 111-mile, 230-kv transmission line extending from Spokane to Lewiston, Idaho. Expected to take two years, the job's total cost is estimated at approximately $3,200,000. Some $360,000 will be spent during 1956.

New rural line extensions definitely scheduled for this year will cost $92,000 and will involve some 30 miles of rural lines serving 135 consumers, most of which are farm households. Urban areas both in and outside Spokane will also get almost $200,000 worth of new distribution facilities during the year. An additional sum of approximately $2,000,000 has been budgeted for construction of improved distribution facilties, including meters and transformers, to serve new customers and steadily increasing load requirements.

Rehabilitation of the company's Post Falls, Idaho, plant will cost $229,700 by 1957 with $118,900 of this amount to be spent in 1956. Constructed in 1906, the Post Falls plant will get new transformers and circuit breakers in addition to other equipment. Approximately $100,000 worth of modernization work will also be done at WWP's Long Lake, Upper Falls and Lewiston plants.

System peak for 1955 was 537,000 kw as compared with 461,000 kw for 1954, an increase of 16.5%.—*J. E. E. Royer, vice-president and general manager.*

Yakima Project, USBR

The Chandler power and pumping plant was virtually completed, and its two 6,000-kw units were being readied for service at the end of the year. Bids were opened in December for construction of the 11,250-kw Roza power plant, for which authorization and an initial construction appropriation were provided by the last Congress. The plant's single unit is expected to begin operation in the spring of 1958.

Wyoming

Kendrick Project, USBR

The 36,000-kw Alcova power plant was completed and both units placed in service.

Missouri River Basin Project, USBR

See report under Montana.

Alaska

Central Alaska Power Assn.

This association, consisting of Matanuska Electric Assn., Chugach Electric Assn., Kenai Lake Electric Assn. and Homer Electric Assn., has completed a study indicating that two 7,500-kw units may be feasible at Cooper Lake. Kenai Lake Electric Assn. has acquired the facilities at Moose Pass and plans to operate on the outskirts of Seward, serving small communities on the perimeter of Kenai Lake. An initial development here would be 500 to 600 kw.

Chugach Electric Assn. has three projects under advisement or construction: installation of a 5,000-kw addition to their extant Knik Arm steam plant, bringing the rating to 15,000 kw, is about 40% complete; three proposed substations; and extension of distribution facilities all the way to Portage along the shores of Turnagain Arm, a distance of approximately 35 miles.

USBR is making field investigations on Caribou Creek, 70 miles northeast of Palmer; the Army Engineers has studies on Bradley Lake showing attractive hydro possibilities in the range of 30,000 to 50,000 kw. There is under advisement an REA cooperative for the villages of Naknek, Glenallen and others. The village of Kotzebue has received authorization from the REA in Washington for an electrical system in that village.

Elmendorf Air Force Base, contiguous to Anchorage, is completing a new steam plant that will have four 7,500-kw units.—*Marlin S. Stewart, manager, Chugach Electric Assn.*

Eklutna Project, USBR

Both 15,000-kw units of the Eklutna power plant went on the line early in 1955.

Hawaii

Hawaiian Electric

The rapid growth of electrical demand on the Island of Oahu has accelerated our program of expanding generation capacity. Plans to install the second of two 50,000-kw-capacity generators in the Richards Street plant, with related boiler and auxiliaries, were started early in 1955. This unit will be Honolulu No. 9 and will be similar to Honolulu unit No. 8 placed in operation in December 1954. Following the mainland trend, Ljungstrom heaters will be used instead of tubular air heaters. The engineering department of the company is preparing the plans for this new unit and construction is scheduled to begin in June 1956. It is expected that the new plant will be in operation by October 1957 but the load from an oil refinery proposed by the Standard Oil Co. of California may make it necessary to move up the date of operation to June 1957.

A total of 8.6 miles of new 44-kv overhead line was added to the transmission system. Of this amount 0.68 mile in the Honolulu area was converted from 11 kv; 1.98 miles of 44-kv line were relocated because of new highway projects or other construction. A total of 5,000 ft of duct line and seven manholes was built on Richards and Beretania Streets to provide additional facilities for 44,000-v cables. Approximately 12,500 ft of low-pressure gas filled 44,000-v cable were installed in this and existing duct line to transmit power from Honolulu unit No. 8 to the Kaimuki-Kapahulu area.

Total distribution substation capacity was increased by 18,475 kva. A new substation was added in Kailua and the capacity of Palolo, Kapahulu, Puunui, Woodlawn, Kamoho, Aina Haina and Wailupe substations was increased. Another major project

completed in 1955 was the construction of warehouse No. 10 at Waiau and the relocation of our pole yard from Pensacola Street.

Other construction included 36 new and rebuilt transformer vaults, underground distribution systems for four subdivisions totaling 120 homesites and overhead distribution systems for 31 subdivisions totaling 1,535 homesites. Approximately 14,000 kva in distribution transformer capacity was added during the year.

Included in the $7,100,000 budgeted for 1956 are the installation of 16,000 ft of 44-kv low-pressure gas-filled cable and the increase in capacity of seven existing distribution substations and one existing transmission substation.—*L. W. Lengnick, vice-president and executive engineer.*

Canada

B. C. Electric

The B. C. Electric Co. during 1955 spent in excess of $36,000,000 on new electric plant to keep pace with and provide for continued load growth in the mainland and Vancouver Island areas. The mainland system peak load for November 1955 was 491,500 kw compared to 432,500 kw for November 1954, not including export energy to the Northwest Power Pool. Energy generated for the mainland system use during the year was up 15% above 1954.

There was no further generation added to the system in 1955; however, the construction of a 42,000-kw generating unit at Seton Creek near Lillooet is now well advanced with initial operation scheduled for the summer of 1956. This station will be unattended and under supervisory control from our Bridge River generating station.

At the beginning of 1955 construction started on the Cheakamus development, which is located north of Squamish. At the present time about 2½ miles of the 6¾-mile diversion tunnel is completed and construction at the dam site is under way. This development will provide a two-unit 140,000-kw addition to the system. Both units are scheduled for operation by the fall of 1957.

There was no major transmission plant added to the system in 1955 but several major lines are under construction for completion in 1956. A second conductor is being added to the existing Wahleach 230-kv line for 345-kv operation in 1956. Connecting to this line, at the new Rosedale switching station near Wahleach, will be a 345-kv line from Bridge River which will provide an alternative major supply link to the lower mainland load area. Approximately 100 miles of this line is nearing completion and construction is under way on the remaining 37 miles.

During 1956, four single-phase submarine cables will go into service for the 132-kv interconnection between the Vancouver Island and mainland systems. Delta substation, which will be the mainland terminal of the interconnection, will have two 66-mva 230/132-kv autotransformer banks and will be supplied by a new 230-kv line from Ingledow terminal station. The new Ingledow station will be supplied by the 345-kv line from Bridge River and will have three single-phase 150-mva autotransformers stepping down to 230 kv. Terminal of the interconnection with the Northwest Power Pool will be transferred from Horn-Payne to Ingledow station.

In the Vancouver metropolitan area, George Dickie substation was added to the 60-kv ring in 1955 with two 25-mva 60/4-kv transformers to serve the Kerrisdale area. A new substation with two 6/8-mva 12/4-kv transformers was commenced in 1955 to serve the university area. In 1956, a new Richmond substation with two 33-mva 60/12-kv transformers will be built to serve the Lulu and Sea Island areas and Kidd substation on the North arm of the Fraser River will be enlarged to provide more 230 to 60 kv capacity.

In North Vancouver, construction began in the fall of 1955 on a new major substation to be completed early in 1956. This station will be fed at 230 kv from the existing Bridge River-Horne Payne line and will supply North and West Vancouver through two 66-mva 230/60-kv transformer banks.

To meet load growth in the Fraser Valley, two 3,750-kva, 60/12-kv transformers were replaced by two 6,600-kva banks at Chilliwack substation, a second unit of 3,750 kva was added at Maple Ridge substation and a new station was put in service at Cloverdale with one 3,750-kva unit. For 1956 it is planned to construct 3,750-kva substations at Delta and at Ruskin and to increase the transformer capacity at Surrey substation from 7,500 kva to 40,000 kva.

A major step in the 1956 program will be the construction of a line to the Powell River area and the provision of associated substation facilities. The initial survey of the 100-mile, 132-kv transmission line is completed with right-of-way clearing and road construction now under way. At Powell River a 20,000-kw frequency changer will be installed to provide a tie with the Powell River Pulp & Paper Co.'s 50-cycle power plants. At Cheekye, north of Squamish, a 230/132/60-kv substation will be built and supplied by the existing Bridge River-Horne Payne 230-kv line. Two 66-mva 230/132-kv autotransformers at Cheekye will supply the Powell River extension and a 33-mva unit will supply Squamish at 60 kv. Cheekye substation will also receive 230-kv power from the Cheakamus development in 1957.

At Goward substation, on Vancouver Island, the fourth 15,000/20,000-kva, 132/60/12-kv transformer was installed in 1955. For 1956, a new George Tripp substation is planned with two 25,000-kva, 132/12/6.9-kv transformers. A substation is also being built at Stratford's Crossing to comprise the Island terminal of the 132-kv interconnection previously referred to.

Many other minor items were completed in 1955 and more are planned in 1956 for both the Vancouver Island and mainland areas for expansion and improvement.—*J. H. Steede, chief engineer, electrical division.*

Two 15,000-kw units at Eklutna plant now serve Anchorage and Palmer, Alaska. USBR

ELECTRICAL WEST

Hear a Dull Thud?

CELEBRATION of National Electrical Week was conspicuous for its lack of impact on the public consciousness in the West. As a national, and annual, activity sponsored by most of the major national organizations within the electrical industry, it merits a lot more attention, activity and recognition than it received this year. Certainly a designated week each year pointing up the benefits and contributions of electrical service to the public has a lot more merit than National Potato Chip Week or National Dog Food Week.

Some people will say that there are already too many industry activities. Others will complain that there isn't enough time allowed to prepare properly for the observance of such celebrations. Still others cite the lack of channels for coordination between various branches of the industry as a reason for the failure to get full mileage out of various industry campaigns. These and many other excuses have a certain amount of validity.

However, the basic thought behind National Electrical Week is sound. With a little planning, a little imagination and just a little extra effort it could be made into a worthwhile reminder of electricity's benefits.

All of us who are in any way connected with the promotional activities of the electrical industry should put an Electrical Week reminder in our tickler files for call-up about Nov. 1. Object: a smack instead of a thud next February.

Take a Second Look

WILLIAM Shakespeare, who established quite a reputation for himself as a phrase-maker, once suggested there could be sermons in stones. The average person probably feels that statistics are much like stones; cold, hard and rather uncomfortable to work with. But that, too, depends upon the particular set of statistics in question.

Sometimes they can be pretty exciting. For example, parents never find the statistics of their first-born dull or uninteresting. Nor do the followers of the sport of kings ignore a scratch sheet.

Statistics on the growth and development of the electrical industry of the West, presented in this issue, are more than just a set of figures to all of us who live with and make our living from that industry. Perhaps you merely glossed over them in getting this far into this issue. If so try taking a second look.

With a little imagination, each and every one of us can see where he has played a part in the development of almost every table. Certainly these statistics represent sound, vigorous growth in which we are all proud to participate.

There is more than that, however, to be read and interpreted there. If these statistics are a yardstick, they measure more than accomplishments measured in mere dollars or kilowatt-hours. They reflect the harvest from the man-hours spent in conferences, in convention halls, on emergency calls, industry fairs, sales teamwork, industry campaigns and all of the other cooperative efforts which have made the public willing and eager to buy our services. And if there's any sermon in statistics, it is that teamwork, Western style, has paid off.

Fronting for Industry

STRIKE-BOUND Westinghouse Electric Corp. plants have become more than an unpleasant incident in the country's economy. Name calling and terrorism that grow apace with unions' rise to power cannot obscure the fundamentals which underlie this situation—namely the worker's right to work and management's right to manage.

As the strike progresses, it becomes more and more apparent that the union has chosen Westinghouse for a show of strength. The electrical industry as a whole and, indeed, all of U. S. industry, can be thankful that the management of the company has the courage and facilities to stand up for its rights and for justice to all its people.

In refusing to "relinquish the reins of management" through arbitration the company's executives are striking a strong blow for the continued growth of the country's dynamic economy. Union leaders overemphasize the role of collective bargaining in

EDITORIAL VIEWS

raising the standard of living. They underemphasize the basic conditions which make collective bargaining gains possible—the increase of productivity resulting from technological advance. In any business, management is in the best position to know just how far the benefits of these two factors can be spread without injustices to any employee group and without impairing the company's growth, progress and competitive position.

Everyone hopes that the strike can be settled quickly. Everyone loses when the productive capacity of a plant as large as the Westinghouse Electric Corp. is idle. Everyone hopes that the strike will be settled quickly—but not at the expense of sacrificing any of the principles of sound business operations or good labor-management relations. And when it is settled, it is to be hoped that all of us in the industry will lend Westinghouse more than just moral support in re-establishing itself as a productive, and constructive, partner in industry growth.

Aftermath

PART of the debris which undoubtedly will be left by the receding flood waters in California will be a new rash of recriminations, innuendoes and finger pointing by public power zealots. These people will be quick to say "I told you so," and to point out that if the federal government had had a free hand in dam building the floods would have been avoided.

In fact, certain irresponsible journalists already have embarked on such a crusade. It is easy for the uninformed to be misled and stampeded into rash actions by distortions and half-truths. The real facts of the case indicate that the existing reservoirs, both public and private, materially reduced the flood crests in several critical areas.

It would have taken a comprehensive series of dams on a scale hithertofore undreamed of to cope successfully with the unprecedented torrential downpour of December. There will be those, however, who will try and make political capital out of the disaster. If the dam system of the country is not further along than it is, the obstructionist tactics of the all-or-nothing federal power proponents can assume a large share of the responsibility.

The failure of this group to accept the "partnership" philosophy of water resources development and control is delaying river development all over the West. The California disaster, rather than being a stalking horse for more federal power, should provide the opportunity to explain again to lawmakers and the public at large the basic benefits from a partnership program. Acceptance of the partnership philosophy will speed the day when water resources are harnessed for the benefit of everyone and will achieve it with the minimum cost to the taxpayers everywhere. Interested public utility bodies, whether they be power companies, irrigation districts or municipal systems, all over the West should take the initiative to make sure that the facts of the California disaster are not distorted to their detriment.

THE vast majority of thinking and farsighted people in the REA program, I am convinced, also "do not belong to either crowd." They do not want the federal government to assume the responsibility for developing all of our electric power resources. They realize that that could lead to complete federalization of the power industry. If that ever happens, the electric cooperatives, and perhaps the municipal plants as well, would be through, and there would be little or no chance of ever turning back.

The pressures that build up wherever there is a resource to develop sometimes result in delay rather than accomplishment. If all the sound and fury in the fight over some of the proposed projects had been diverted into cooperative effort, some of them doubtless would be in operation today.—Ancher Nelson, Administrator, Rural Electrification Administration, before American Farm Bureau Annual Meeting, Chicago, December 1955.

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

After the Great Ford Foundation Gift...

What Still Remains To Be Done To Provide Decent Faculty Pay

The Ford Foundation's gift of a half billion dollars to our privately supported colleges, medical schools and hospitals, now being distributed, is magnificent. But it will be much more magnificent if it inspires completion of the job to which it gives a lift. So far as the colleges and universities are concerned, this job is primarily to rescue their faculty members from being second-class citizens economically.

Even in a period when we have become accustomed to astronomical financial figures, a half billion dollars remains an eye-popping gift. In fact, it is so imposing that a good many people who don't read the fine print are apt to conclude that it must just about solve the financial problem to which it is addressed.

Goes Only a Small Way

However, we have allowed college professors to fall so far behind the parade financially that the share of the Ford half billion dollar gift going directly to the improvement of faculty salaries ($210 million) will go only a small way financially toward doing what is necessary to provide adequate salaries.

Completion of this job for our privately supported colleges and universities calls for:

1. An increase in faculty salaries at least five times as great as that made possible by the Ford gift merely to restore salaries to their 1939 purchasing power level and an increase fifteen times as great to provide adequate salaries today.

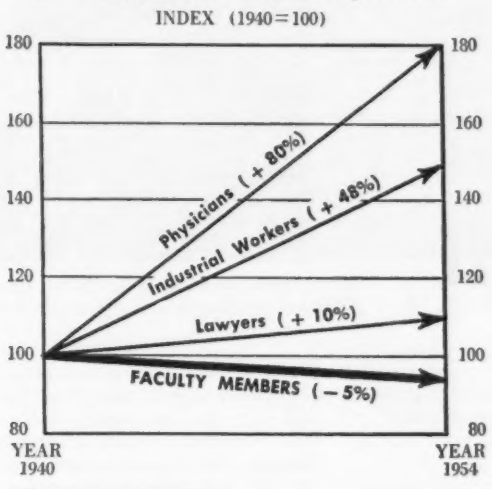
2. Some difficult and courageous decisions by the heads of the colleges and universities in apportioning the grants received by them.

Terms of Gifts to Colleges

The $210 million of the Ford Foundation gift going specifically to improve faculty salaries is being distributed on the following basis: Each of 615 privately supported, regionally accredited liberal arts and science colleges and universities receives a gift about equivalent to its last year's teaching payroll. For ten years only the income from these gifts is to be devoted to raising faculty salaries. After that all the money can be spent in any way the institutions receiving it see fit. There is no requirement that universities having other than liberal arts and science schools limit use of the gifts to improving salaries in these schools alone. They can spread it right through all their faculties if they wish.

In addition to the gift of $210 million specifically directed to increasing faculty salaries, another gift of $50 million goes to a group of 126 institutions selected for specially noteworthy leadership in improving

What's Happened to College Faculty Salaries*



* Real Income before Taxes.

Source: Council for Financial Aid to Education; U. S. Dep't of Commerce; U. S. Dep't of Labor.

the status and pay of teachers. For these schools the individual gifts add about 50% more to the amounts coming from the $210 million fund. They can be used to improve faculty salaries if the institutions choose to do so, but this is not required by the terms of these gifts.

The $210 million plus the $50 million should yield an income of $10-$13 million a year. Even if all this is used to raise salaries, it will be only a small step, however worthy, toward the $200 million per year the colleges need to meet their salary requirements adequately.

Helps Some Who Need It Most

In focussing its gift to improve faculty salaries in privately supported liberal arts and science colleges, the Ford Foundation aims at least part of the help at the spot where it is most desperately needed. Numerous surveys have indicated that the most poorly paid of all college and university faculty members are those in small, privately endowed liberal arts colleges.

But the overshadowing fact is that the teachers in our colleges and universities as a whole are badly underpaid. Just how badly is indicated by the chart above which first appeared in an earlier editorial. (Figures later than those for 1954 are not available.)

The Ford gift will turn the indicator of faculty salaries, which now lies far below the general salary trend, upward a few points. And it will do this in some places where salaries are below the wretched average shown by the chart.

But the Crucial Test Remains

College and university administrators will have the opportunity to extend further the process of getting the help provided by the Ford Foundation gifts where it is most needed. In general, this will mean giving it to senior faculty members, in order to hold experienced teachers and make college teaching attractive as a career. But to make such a division in many schools will take extraordinary fortitude.

The crucial test of the success of the enterprise of the Ford Foundation in raising faculty salaries will lie in whether it prompts the rest of us — college alumni, individuals, business firms and legislators alike — to see that it is a great beginning, not a signal for a recess.

Even with the Ford gifts providing $10-13 million a year, our privately supported colleges and universities must have an increase of about $190 million a year to provide decent faculty salaries.

This is a job far beyond the capacity of the Ford Foundation, imposing though that is. It is a job far beyond the capacities of a few hundred large corporations and a few thousand wealthy individuals. If it is to be done, it is a job at which all of us must work with a will.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw
PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

"We have no evidence pointing to anything other than a repetition of the upward trend of 1955."

—Southern California Edison Co.

Industry-wide team work aims at

The Big Payoff

Utilities cooperated in the model home showings like this one in BCE's territory

Phenomenal population growth in the West, together with high incomes and full employment, created a favorable sales climate in 1955. Reports from Western utilities indicate that business will be as good or better in 1956; some even forecast a record year.

Population is still increasing; construction is at a record peak; new industry is moving into the area; existing industry is expanding. This is the story in almost all sections of the West.

With people apparently willing and able to buy, with plenty of merchandise coming off the assembly line and ample plant capacity to serve new load, utility promotion plans are geared to help channel dollars into electrical living. Always cooperative, the programs this year put even greater emphasis on teamwork—joint action by the electrical industry to whip the wiring bottleneck; to sell electrical living; cooperation with local leaders in bringing in new industry.

Final Figures in March

This year again tables of appliance sales, number and classes of customers, kwh consumption per residential customer, etc., are being held for the March issue when final figures for 1955 will be available. *Electrical Merchandising* in January published national figures along these lines, with estimates of sales in the regions based on the first three quarters of 1955. It is interesting to note that according to these estimated figures there are more than 6,622,100 domestic customers in this region; they used an average of 3,467 kwh; they spent an average of $108.95 on appliances during 1955. Shipments of major appliances to the Pacific and Mountain regions as compiled by *Electrical Merchandising*: eight-month estimates—washers, 419,738; ironers, 6,231; dryers, 123,994; TV, 584,284; nine-month estimates — refrigerators, 370,118; freezers, 38,743; ranges, 156,209; water heaters, 48,598; seven-month estimate—radios, 395,442.

Arizona

Arizona Public Service

Our 1955 sales program, "Sell UP," was responsible for slightly more than $6,000,000 in estimated annual revenue. Of this total, new residential revenue amounted to approximately $2,500,000. Commercial and industrial revenues added 3¾ millions of dollars in new income during the year.

One of our top sales projects during the year was a home freezer promotion which was a four-way effort on the part of the utility, grocers selling frozen foods, appliance dealers and newspapers. A long-range program, "Timely Tuesday," is designed to sell more and larger home freezers by increasing the demand for frozen food.

A direct sales campaign promoting automatic frying pans with company employees participating, in cooperation with appliance dealers, resulted in the sale of 3,500 of the utensils in selected services areas. This was the first time a concentrated campaign of this nature had been tried and the total of the appliances sold represented 10% saturation in the campaign area.

Better utilization of electric services in the home with emphasis on low-saturation appliances was part of the "Sell UP" program as it applied to demonstration booths at six county fairs and the State Fair. Our participation in the Appliance Merchandisers Assn. Television Fair in Phoenix was well received. A home lighting booth was used effectively at small community fairs and celebrations.

For 1956 we are planning a big program with emphasis, residentially, on cooperation with home building contractors. Built-in and low saturation appliances will be promoted through this medium. Our commercial and industrial salespeople will continue their activities with business and industry. We are looking forward to more than $7,000,000 in new business in '56.

Kicking off the year's residential activities will be the "Parade of Homes"—18 new homes in one area constructed by Phoenix contractors. Our company is offering a trip to Hawaii to the builder making the most effective use of our service. Scoring in this competition will be determined by the use of certified adequate wiring, light conditioning, installation of year 'round air conditioning, completeness of kitchen and laundry equipment and allied features.

All indications are that Arizona will continue to do bigger and better things in 1956. The recent announcement that a large aircraft electronics firm will locate two major installations in the state typifies this growth as far as manufacturing is concerned.

Arizona's mining activities, with copper prices and production zooming, look better than ever for the future. It will not be long before the state is responsible for more than half of the nation's copper production.

Commercial and residential building will maintain about the same level of activity as in 1955. This goes hand-in-hand with the continued growth of population being experienced in greater degree, percentagewise, than in most other states. Arizona's strategic location midway of Texas and California weighs heavily in the favor of population growth.

Investors from other localities are maintaining their interest in Arizona properties and enterprises.—*Don Willis, vice-president in charge of sales.*

Navopache Electric Co-op

It appears that business outlook for the territory served by our coopera-

Shows and cooking schools were jointly sponsored. Left, a part of the crowd at Susanville showing in California Pacific territory. Right, Edison sponsored a telecast from the Los Angeles County Fair, telling about the electrical products, urging attendance

tive in 1956 would be comparable to our 1955 experiences. We experienced satisfactory increases in membership as well as kwh sales during 1955 as compared to 1954. As you probably know our area is very rural and not highly commercialized. The chief commercial enterprise is lumber manufacturing. Market for lumber for this year appears to be the best of any for a number of years.

We plan on an active power use program for this year. We have a full time power use employee who covers the territory giving demonstrations on all types of home appliances and special helps for small commercial use.

We are experiencing a popularity growth in our summer home areas. Quite a portion of our territory is in the White Mountain area and heavy timber and is most desirable for recreation and summer homes. Most of these summer homes equip their new places with full electric kitchens and electric space heating. In one area where about 60 new homes were built the latter part of this past summer, there has not been a single butane or gas installation. All new applicants for service are briefed by our secretary on the desirability of good electric heating and results have been very satisfactory.—*Dewey Farr, manager.*

Salt River Power District

The business outlook for Maricopa County, and Phoenix in particular, is excellent. The economy of this area is changing from agricultural to manufacturing as indicated by an increase of 2,000 manufacturing workers to a total of 17,900 in October 1955—a gain of 13% over a year ago. Until the year 1954, agriculture was the major economy of Arizona. However, the total dollar value of manufactured products in 1954 exceeded the total value of agriculture products by $22,000,000 and it is conservatively estimated that manufactured products will exceed agriculture by $50 to $75 million in 1955. We expect this trend to continue in 1956.

The Sperry-Rand Corp. announced recently that it will be building a multimillion-dollar plant in the Phoenix area beginning early in 1956 that, when completed, will provide employment for 3,000 people. New industries are locating in the Phoenix area at the rate of about three per month which is partly caused by military agencies in Washington declaring Arizona as one of the most desirable states for dispersion of industry.

Arizona's diversified economy plus its superlative climate have made it one of the fastest growing states in the Union. Maricopa County, of which Phoenix is the county seat, represents about 50% of the state's population (500,000). The minimum growth forecast by population studies of this area is for a population of 700,000 to 900,000 in Maricopa County by 1965.

In order to serve our territory adequately and efficiently we are at the present time building the Agua Fria steam plant. This plant will cost over $25,000,000 and will consist of two 100,000-kw units, one to be completed in 1957, the other in 1958.

Our promotional programs for 1956 include advertising in newspapers, magazines, television and radio programs and window and billboard advertising. Also, we are actively participating in the Appliance Merchandisers Assn. selling program of all electrical appliances and the "Live Better . . . Electrically" promotion. We will participate and support public education and community cooperation programs and have budgeted money for production of a movie. Included in our plans for 1956 is a heavy and sustained promotion aimed at producing wide general acceptance of the heat pump, electric space heating and electric water heating in our service area. Present plans include advertising support of this promotion in all media along with the possible development of a special incentive rate for electric heat pumps to further increase the over-all effect of the promotion.—*V. A. Pierce, manager, industrial relations.*

California

Burbank PS Dept.

The economic picture of this city is closely related to the economy reflected by the aircraft, motion picture and television industries. The predictions for these groups will also be true for the city of Burbank.

Sales of most major appliances, electric ranges, refrigerators and automatic washers, have fallen below the figures of the previous years. Television has held steady. Air conditioning continued to make additional strides, however; this was accounted for, in part, by the extended hot spell.

This past year has shown that consumer thinking in terms of built-in appliances has increased. Actual installations, remodeling, have begun to pick up momentum. Dryer sales and installations have shown a steady increase. The only detriment is the cost of wiring and, to this time, we have not solved the problem by adopting a wiring participation program. The partial solution has been to push the use of this appliance on a 110-v circuit.

Demonstration classes in the use of electrical appliances, titled "Electricity For Better Living," co-sponsored by this department and a series of Burbank electrical appliance dealers, will be continued through this year. It is the intent of this activity to be institutional, to instill the use of electrical work savers and conveniences in the minds of our consumers.

The concentrated effort by all of the electrical industry to educate the

public to adequate wiring and living electrically, touched off by the Live Better . . . Electrically program, is the answer to continued growth.—*H. E. McComas, customer relations agent.*

California Electric Power

The business outlook for 1956 in the service area of California Electric Power Co. is excellent. 1955 was one of our best growth years. We expect as much or better for 1956.

The ratio of our residential and commercial sales to gross sales continues to increase indicating, at least to some degree, the successful efforts of our promotion of higher priced kilowatt-hour sales. Our principal sales promotion program for 1956 will be beamed at these classifications.

Our desert areas have had and will continue to have tremendous growth. This is caused by the expansion of industry into these areas, the healthful climate and the freedom from metropolitan congestion. Our areas in the Santa Ana River Basin continue very healthy increases and with the new freeways into the Los Angeles metropolitan area have developed into residential locations for commuters.

In order to meet the demands of ever-increasing population and the new electrical uses in home, farm and factory, we are substantially increasing our sales promotion personnel for concerted action in 1956.—*D. B. Wheelock, commercial vice-president.*

California-Pacific Utilities

A comparison of load building results during the past three years, shown in table, will be informative as to trends of business activities in the electrical industry in the company's service area.

	1953	1954	1955*
Per cent increase in electric revenues	12.5%	8%	6%
Average annual kwh per domestic customer	4,817	4,952	5,400
Per cent increase in average annual use—domestic customers	10.8%	2.8%	9%
Per cent increase (decrease) in dealer appliance sales	2.4%	(1.6%)	11.8%

* Actual 11 months, estimated 1 month.

The increase in electric revenue during the past year, though somewhat lower than for the two preceding years, still reflects the vigorous growth of business and industry and the favorable economic factors to which can be attributed the general optimtisic attitude of all customers in the company's service area. Rural and commercial customers have accounted for an increasingly greater proportion of this growth of our business, which confirms the general opinion that farmers and business people generally have fared well during the past year. Present trends indicate we may expect the growth of our business to continue at the same rate during 1956.

The industry took joint action on wiring bottleneck. Navopache display was a tie-in

The highly satisfactory 1955 rate of increase in the annual use of electricity by the company's domestic customers compares favorably with previous rates of increase during 1953 and years prior. Every year during the past 10 years our domestic customers have increased their average annual use of electricity by more than 10%, except during 1954 when the company provided natural gas service in a service area comprising approximately 10% of its domestic electric customers, and this rate of increase by domestic customers was reduced to the lesser amount shown for that year.

The sale of major electrical appliances by dealers on the company's service area increased greatly during the past year as indicated in the tabulation. We believe this is due to (1) improved economic conditions with the maintenance of high levels of employment in the lumbering industry and a satisfactory rate of business volume and farm income; (2) a better selling job by electrical appliance dealers and distributors. Appliance dealers realized that competition for the consumer dollar required greater sales effort and increased their sales forces and improved sales methods, with excellent results.

The outlook for 1956 promises a continuation of the present high level of business volume, and no great change in employment or the economic conditions for industry or agricultural enterprises on the company's service area is expected. Rate of increase in electric revenues may level off somewhat; however, the rate of increase of the addition of new customers is expected to increase slightly due to the increased business and industrial activities in parts of the service area.

Our plans for load building activities for 1956 include:

1. A continuation of our electrical appliance dealer and contractor cooperative sales promotional program with the usual cooperative advertising and dealer-contractor sales aids that will cause them to take action that will continually improve their sales methods and promotional efforts.

2. Sales promotional activities will include full cooperation with all segments of the electrical industry in the nation-wide "Live Better . . . Electrically" program aimed at increasing residential use of electricity. Dealer contacts and group meetings are planned to help sales promotional activities and inspire them to carry out public appliance demonstrations and shows, which will improve sales results. The company's home economists will be available to assist dealers on numerous such shows and demonstrations.

3. Active promotion of adequate wiring in the homes and commercial establishments will continue and greater effort will be expended to persuade electrical contractors it is to their interest to utilize the help of local lending agencies to finance customer rewiring projects.

4. During the past year numerous agricultural irrigation projects were completed by our rural customers who received the help of sales personnel in planning and engineering their projects. These activities will be continued and irrigation equipment sales agencies will continue to receive our help in the promotion and planning of many new irrigation projects contemplated by rural customers.

5. Numerous new commercial lighting installations were completed during the past year and sales promotional activities will continue to assist electrical contractors in the planning and sale of the numerous prospective proj-

Salt River promoted a fuse-blowing game

ects as more commercial establishments are realizing the benefits of good lighting.

6. Several new street lighting projects were completed in various of the company's service areas during the past year and a number of new projects are being planned. The company's policy of assisting various communities in planning and installing high-intensity street lighting will continue and it is expected that this important community improvement program will near completion during 1956.

The company's substantial 1956 construction budget will provide the additional new facilities needed to amply supply the expected satisfactory rate of load growth as well as provide for spare capacity. Our field management reports all associates of the electrical industry in our various service areas are highly optimistic concerning business prospects for 1956 and we look forward to excellent sales results by all segments of the industry.—*E. A. Nickelsen, commercial manager.*

Los Angeles Dept. of W&P

The business outlook for the area served by the Los Angeles Department of Water & Power holds the qualified promise that the level of appliance sales reached in 1955 will be matched by sales in 1956. Two reasons underlie the department's cautious appraisal of the business expectations for 1956.

General business gains over 1954 continued to be the rule during all of 1955. However, the rate of the business gain has slowly but definitely declined during the final quarter of 1955. This diminishing rate of gain is not considered an all-controlling factor as to how electric appliances will sell in 1956, although it appears as a sobering influence. It is believed that holding the 1955 sales level in 1956 will depend more on whether all elements of the electric industry can get together on sound coordinated sales action programs.

This coordination is urgently needed in the Los Angeles area even though all major distributors confirm stepped up sales promotions for 1956 and some of the appliance dealers are sharpening the sales personnel.

First to step out in the direction of industry-wide sales planning is the Department of Water & Power with a long-range five-year sales program. The department's selling plans will be outlined in the near future.

The department's plans are coincidental with the national "Live Better . . . Electrically" program which is being sponsored locally by the department. This program will be presented to the electric industry and its trade allies through a national closed-circuit telecast Feb. 8, 1956.

The department's program means stepped up advertising and sales promotion supports for appliance dealers both in the new and in the existing home markets. Reorganized sales units and added personnel, where needed, will make a strong play for the high business potential in home modernization, including rewiring of homes. Participation in the Home Show and other exhibits will promote new construction and modernization business.

Our recently organized Building Industry Sales Unit has been highly effective with sales of built-in electric ranges in the competitive new tract homes. They have made impressive new sales records in adequate wiring and in selling other major electric appliances to the builder.

Planned promotions coordinated by the Los Angeles Electric League on major appliances such as clothes dryers and air conditioners will extend through the yearly calendar to move electric appliance sales ahead.—*R. H. Cockfield, business agent, power system.*

Modesto Irrigation District

Modesto Irrigation District has continued to grow at approximately the same rate in 1955 as for the past ten years. Ten years ago there were 12,537 domestic accounts and at the close of 1955 there were 20,919 domestic consumers.

It is interesting to note that during the year 1946 the average consumption per domestic meter was 2,469 kwh. For the year 1955 this figure has increased to 3,332 kwh.

Dealers in this area are doing a good job. We have at least ten dealers doing a gross volume of over $25,000 per year in television, electric housewares and appliances.

The district does not do any direct selling. Assistance is given to the electric dealers in the form of radio and newspaper advertising.

Present indications point to a continuation of the same economic growth in the Modesto area as experienced in 1955.—*C. E. Plummer, chief engineer.*

Pacific Gas and Electric

That the drive of '55 will carry through '56 is indicated in the company's Market Outlook for the 46 counties it serves. This comprehensive annual report on market factors is prepared to help industry associates appraise business activities for the year ahead. It finds these favorable influences working to support a vigorous economy in northern and central California during 1956: (1) population expansion; (2) construction at record peaks; (3) employment at high levels; (4) disposable personal income continuing to rise; (5) a tremendous public works backlog.

Here are a few of the findings and estimates:

Expected population in California by the end of 1956 is 13,650,000 (6,164,000 in the PG and E service area). An estimated 71,000 new homes will be built in northern and central California during 1956, about the 1955 figure. It is believed that by the end of 1956 the company will be serving 1,756,400 electric customers, up 3.7% from meters in service at the end of 1955.

California's cash farm income again is the highest in the nation, exceeding $2,500,000,000. During the past 11 years 7,441 plants made commitments to the extent of $1,744,010,526 in the company's service area. In 1925 each industrial worker had only 4,820 kwh a year to assist him. In 1955 he had 15,000 kwh, the equivalent of 224 men working with him. Amount of electrical energy consumed per worker is in-

"Holding the '55 sales level in '56 will depend . . . on whether all elements of the . . . industry can get together on sound . . . action programs."

—Los Angeles Department of Water & Power

AGRICULTURAL MARKET OPPORTUNITIES

A spread from PG and E's 1956 Market Outlook presented to members of the industry

creasing at the rate of 4% per year; is expected to increase in 1956.

Energy use by chemicals recorded a sharp gain in 1955; may reach a new peak in 1956. Power use by oil refineries, already at an all-time high, is expected to climb to a new peak because of expansion plans. Also expected to be up are sales of power to metals; food and beverage; building materials.

A coordinated industry-wide promotional sales program will be aimed at keeping appliance sales at a high level. The company expects 471,600 unit sales of major appliances to be made in its territory in 1956. This is just slightly under the high record of 1955.

According to O. R. Doerr, vice-president in charge of sales, the company—through its cooperative business-building program—will vigorously carry forward its policy, which holds that the best public service can only come from a united industry composed of manufacturers, wholesalers, contractors, dealers and the utility.

It will continue to promote the expansion of existing business and industry, work to attract new industries and enterprises; employ the most effective means of educating its customers toward a broader and more complete use of its services for the mutual benefit of the customers and the industry as a whole.

Though it does not merchandise, the company will continue to cooperate extensively with manufacturers, wholesales, contractors and dealers in promoting sale and use of equipment. Programs of cooperative promotions will be coordinated with the activities of the organized associations and other agencies of the gas and electric industry.

The company will make available to its customers information and advisory services designed to bring about more efficient utilization in commerce, industry, agriculture and the home. It will cooperate with and offer leadership to all branches of the industry so that the public will be served promptly, efficiently and adequately.

Pasadena L&P Dept.

The business outlook in Pasadena appears very good for the coming year. We have no promotional programs for sales and expect to do very little. We will continue with our range wiring program, servicing of appliances and other aids for our customers.—*F. V. Frey, supervisor, customer service division.*

Riverside PU Dept.

We are quite optimistic regarding the business outlook in 1956 for our area in the city of Riverside. Present indications are that it will keep pace with 1955 and possibly pass this record year.

In 1955, we installed a total of 1,610 new meters and, as of this date, we have filed maps of new subdivisions that are either under construction or will be started in the near future. It looks as though new connections in 1956 will surpass last year. In addition to these, the construction of individual homes with 200-amp services will exceed those of last year.

Two new elementary schools are being completed at this time, plus new classrooms in existing schools. Construction was started on a new high school and bids will be opened soon on a new junior high school. Two large shopping centers are now under construction and plans are being completed for four additional centers.

Our promotion activities in 1956 will be stepped up and intensified by closer contact with dealers, prospective home builders and with speculative builders of tract homes. Emphasis will be placed on built-in equipment which began to show results last year. Range installations in 1955 were well ahead of any previous year and we will continue our participation in range wiring.

The sale of air conditioning units increased in 1955 and sale of this equipment will continue to increase very rapidly.—*C. A. Dahlgren, commercial supervisor.*

Sacramento MUD

Our faith in the continued growth of the Sacramento area is evidenced by the fact that we are substantially increasing our sales promotion programs both by increased personnel and stepped up activities.

We will stage a second Bonus Bulb Campaign, which will stimulate light bulb sales in this area.

We will stage our Fourth Annual Electric Range Contest in March and anticipate an even more successful event as our plans call for dealer incentives that will make effective allies of dealer salesmen.

We expect to promote a Dryer Contest in the fall along the same lines as our Range Contest.

In June, July and August we will promote the two-zone refrigerator-freezer combination by newspaper advertising, billboards, car cards and radio spot announcements.

We will participate in Sacramento's Parade of Homes sponsored by the Associated Home Builders and will endeavor to have an even greater number of these homes adequately wired and lighted and equipped with electric ranges, water heaters, dryers, dishwashers, etc.

We will furnish additional stimulus to the Wiring Modernization and Adequate Wiring programs and emphasize the no-down-payment plan developed in conjunction with the Sacramento banks.

We will continue to promote the quick recovery electric water heater both in new homes and the replacement market.

Other activities will include participation in the State Fair, Food Fair and County Fair; promotion of commercial wiring, 4-H and farm electrification, rural-domestic and school home economic promotion and a drive for more completely electric school kitchens.

Forecasts for 1956 in our service area are for continued building activity in the subdivision field and generally sat-

"We will get about 25% increase in sales . . . We won't have any promotional programs at all. To do so would be like throwing gasoline on a grass fire."

—Palo Alto Electric Department

isfactory business conditions.— *G. L. Cane, director, electrical development.*

San Diego G&E

Reports from all parts of the nation, and the Pacific Coast in particular, sound a strong note of optimism in the economic outlook for 1956. San Diego is no exception.

The aircraft and related industries, which are the backbone of San Diego's industrial economy, are operating at full capacity with a steady demand for more skilled workers resulting from recent awards of major commercial and military contracts which advanced the local industry's backlog to well over a billion dollars.

The tourist trade outlook for the area for 1956 will, from all indications, be even larger than the record-breaking year just ended, which brought over $100,000,000 into San Diego County. The project "Fiesta del Pacifico," which begins July 19, is expected to become an annual event of international importance.

Home building in San Diego County resulted in over 11,000 new homes in 1955, and accounted for 75% of all new construction totaling over $157,000,000, and there is no evidence of reduced volume for 1956.

Retail sales in 1955 set a new all-time high of $952,000,000 and there is every indication that 1956 will probably exceed the billion-dollar mark, a figure previously achieved by only 20 major United States shopping centers. Included in these retail sales gains were home appliances of all kinds and the industry is looking forward to further substantial increases in 1956.

San Diego Gas & Electric Co.'s plans for the promotion of electrical appliances call for the largest sales promotion and advertising expenditures it has ever made. The entire promotional program of the company, in cooperation with the Bureau of Home Appliances, has been geared to the expanding economy of this area, with particular emphasis upon the problem of upgrading the electrical wiring and equipment of mass produced homes, as well as the ever-present problem of promoting the sale to all customers of appliances which build new loads for the system.—*R. J. Phillips, vice-president in charge of sales.*

Southern California Edison

The year 1955 was a banner year for the Southern California Edison Co. in many respects. Net domestic meter gain reflected the housing boom of 1955 in southern California and totaled more than 79,000, the biggest annual gain in the history of the company. New industrial and commercial horsepower signed also mirrored the over-all growth of the local economy, being up substantially over the previous record high year.

The outlook for 1956 for the Southern California Edison Co. is for a continuation of last year's expansion. We have no evidence pointing to anything other than a repetition of the upward trend of 1955. Almost all types of business on negotiation were at somewhat higher levels at the end of 1955 than 12 months earlier.

The objectives of our sales program —reactivated in early 1955 after a number of years of relative dormancy —are to (1) give all our customers the best possible service and (2) promote increased usage of electricity by customers having desirable revenue and load characteristics. Therefore, most of our sales promotional effort consisted of encouraging the use of electricity by residential, commercial and selected types of industrial loads.

Our residential sales promotional effort in 1955 made definite progress in the achievement of our goal to bring the advantages of electrical living to the homes of southern California. During the past year we focused our attention on the home builders within the service area. In doing this, special emphasis has been placed both on installation of electrical equipment and adequate wiring. The results have been most rewarding. Leading builders have now discovered the enhanced salability of the home with the all-electric kitchen and we look forward to its expanded use as a sales tool by home builders during the ensuing year.

Last year also marked the beginning of a definite trend toward the use of the heat pump and the all-electric home in the Southern California Edison service area. We anticipate an acceleration of this trend as the advantages of the all-electric home become more widely known.

New residential sales promotional programs to be launched in 1956 will be tied in with the national "Live Better . . . Electrically" program, aimed at increasing sales by dealers.

Our commercial and industrial sales program during 1955, besides assisting customers in every way possible, has been aimed at selected areas of high net return including lighting, commercial cooking and other carefully selected commercial and industrial loads. A particular effort has been made to demonstrate to establishments such as restaurants and industrial plant cafeterias the economies and advantages of electrical cooking. In addition to the continuation of these programs in 1956 we, together with General Electric Co., plan to sponsor an industrial productivity forum. Objectives of these forums are to (1) advance productive efficiency of industrial plants, (2) expand power sales of electric utilities, (3) increase sales of electrical equipment manufacturers and (4) become better acquainted with top industrial management.

The year 1956, as a whole, should be one of high-level economic activity in southern California with the growth of the Southern California Edison Co. continuing at approximately the same rate as in 1955.—*Harold Moore, general sales manager.*

Colorado

Colorado Central Power

In this area the business outlook for 1956 is good and it is anticipated that retail sales will be above 1955. This is one of the fast growing areas of the country and industrial growth is keeping pace with the population.

Sale of electrical appliances by aggressive dealers was greater in 1955 than in 1954 and we believe this type

Arizona PS staged cooperative fry pan sale

of merchandise will move faster in 1956. Some drought area dealers were hard hit but a little moisture will change that picture.

Our company does not merchandise but we will continue to work with dealers promoting the sale of appliances. Special sales campaigns for load building appliances will be set up for dealers, our appliance advertising will tie in with dealer ads, and we will continue to subsidize range and dryer wiring. Also, we will tie in with the national adequate wiring program more than we did last year.—*Lawrence L. Gann, commercial manager.*

Public Service of Colorado

We believe that 1956 business conditions in our area will equal, if not exceed, 1955. We are quite sure that the amount of industrial and commercial construction in the area will be in excess of 1955 and will more than compensate for the slowdown in home building, which we expect to encounter. Several new large industrial plants have started construction, new commercial establishments are under way, and a number of new office buildings are in the course of construction.

We expect to carry on promotional and sales programs on adequate wiring, automatic dryers, water heaters, ranges, air conditioning, residential lighting and electric bedding. These programs will all be cooperative in nature and will be participated in by distributors, dealers and contractors. An Electric Modernization Bureau, consisting of 48 contractors, has been organized to promote and sell modernized wiring. This organization started operating Jan. 2 and is being supported by cooperative advertising of manufacturers, distributors and electrical dealers, as well as the utilities. All members of the industry in this area will support the Better Electrical Living program.

We look for 1956 to be a very active load building year.—*G. W. Thomas, general commercial manager.*

Southern Colorado Power

Our business has increased in about the same proportion that has been our experience in the past several years. Customer gain should be about the same rate of approximately 5%. It is expected that sales of electrical energy will be about the 13 to 15% increase over the previous year that has been shown most all season on a month-to-month basis. Residential construction dollar-wise reached an all-time peak in our area in 1955 as shown by building permits. Commercial and industrial building was ahead of 1954 but not quite up to the previous high of 1953.

Retail sales will be ahead of 1954 by about 6 or 7% when the final count is made. Hard goods will show an increase above soft goods with electrical appliances holding their position in this market. Traffic appliances probably reached an all-time high during the past Christmas season. Most distributors and dealers had complete inventory sellouts in many appliances. This was particularly true in several big name brands.

Looking into 1956 we expect general business conditions to be about the equal of 1955. Residential construction is scheduled to be on the same rate as last year with two of our larger builders stepping up production slightly. Commercial and institutional construction scheduled for starts and some completions in 1956 will be greater in 1956 than in 1955. Building permits, contracts let and bids out for early letting are at a higher level now than the total of that type construction last year. Highway construction for this year will surpass 1955 with a major portion in the heart of our area for the relief of overcrowded highways and streets.

Preliminary industrial outlook for new construction looks very good for the year. Two of our larger industries are planning increases in their buildings and facilities that will exceed 1955 and there is still much planned but as yet unannounced construction in several of the medium and smaller industries. There is considerable increase in activity in the mining areas, both metallic and nonmetallic. With a reasonable amount of water in snow or rain the agricultural outlook is not greatly different than for the past season.

We plan to continue an aggressive sales promotional program on all electrical appliances with particular emphasis on the load-building type of appliance. We will follow the schedules adopted by the NEMA group and will give particular emphasis to rural load building in cooperation with other power suppliers, manufacturers, distributors and tie-in with dealers. The Colorado Farm Power Council, organized a little over a year ago along the design of similar organizations in many other states, will carry on this activity aggressively in most parts of the state, which should be very beneficial to rural business.

There has been a great increase in the interest in built-in cooking units in our area with some builders furnishing these units with the home and finding that buyers are demanding these new conveniences. We believe this trend will increase during 1956. While we do merchandise, we will continue to slant our advertising in all media toward the end of boosting business for the dealers.

The company's plans for 1956 include considerable expansion of transmission and distribution facilities and firming up present line and substation capacity.—*E. H. Pemberton, general sales manager.*

Western Colorado Power

See Utah Power & Light Co., Utah.

Idaho

Idaho Power

We feel that 1956 will be as good a year as 1955 and better. The company is planning an active area development program in 1956. This program will be initiated by the district managers, who will enlist the support of local leaders. Small group meetings are planned to differentiate between potential industrial prospects and decide which are the best prospects. A carefully thought out sales story will then be prepared for each prospective industry. Use of direct mail, contacts through local industries and personal contacts are visualized.

Key promotions of 1956 will sell the benefits of complete electrical living. Goal in the residential and farm classification is $790,057 of new revenue. Efforts will be concentrated where they will bring the greatest sales returns—on the customers yet to be sold in the 9 mill per kwh bracket. The company has provided a new sales tool—a pocket-size cost estimator for appliances added to the bargain step of the domestic rate.

Aggressive promotion of small commercial and industrial sales is planned. The company will continue its lighting planning service; will give special help on larger commercial water heating applications; will carry on a well-organized program for the restaurant trade; will sponsor jointly with Hotpoint a training school in commercial cooking to familiarize commercial representatives with use of the equipment; will renew its cash trade-in of gas

"The year 1956 may be considered a Year of Challenge to business and industry."

—Pacific Gas and Electric Co.

equipment on electrical equipment through dealers; will supply and pay for installation of temporary wiring needed to demonstrate commercial electrical cooking devices and will pay the dealer 10% of the list price of any new device used if the demonstration does not result in its sale.

We will carry on an intensive contact program with our larger industrial customers to acquaint them with the services available through the coordinated efforts of our company with the entire electric industry. During 1956 we will make at least four calls on each industrial customer.—*A. S. Gilbert, sales manager.*

Northern Lights

Two surveys have been done by Northern Lights, the first in September 1954 and the second a year later. Items on the survey, and the saturation and the gain are:

Appliance	Saturation 1954	1955	Difference
Refrigerators	91.1	92.0	+ .9%
Ranges	24.1	36.0	+11.9%
Washers, conventional	56.6	65.0	+ 8.4%
Automatic washers	5.4	9.0	+ 3.6%
Clothes dryers	2.8	6.0	+ 3.2%
Water heaters	29.0	31.0	+ 2.0%
Water systems	41.5	42.0	+ .5%
Food freezers	22.5	28.0	+ 5.5%
Space heating	9.5	13.0	+ 3.5%

Northern Lights does not merchandise but information regarding the appliances people plan to buy was also requested. In the 1954 survey this total was 1,082. In the 1955 survey this number was 972, while just with Sec. 5 financing alone more than 400 major appliances were added in 1955.

Much of the success of the load-building program can be attributed to the Sec. 5 financing plan available to Northern Lights members. Briefly it is financing up to $2,500 for plumbing, wiring or appliances, with 20% down and 4% interest on the unpaid balance with as long as five years in which to pay. Appliances on these contracts are: refrigerators 53, ranges 71, conventional washers 8, automatic washers 45, clothes dryers, 50, water heaters 68, water systems 14, plumbing installations 15, food freezers 68, space heating 198 kw, dishwashers 6, irrigation systems 6, small appliances, television sets, milking machines, etc., 39.

The total amount loaned under this program was $135,816.82 for 269 loans, with about 35 dealers participating. It was interesting to note that, even though refrigerators showed 92% saturation, 53 went on Sec. 5 contracts. This points out the potential in the replacement market.

It goes without saying that this has meant much to members, dealers and to Northern Lights the estimated annual revenue added is about $1,500 per month.—*Ora E. Beasley, manager.*

"Natural gas will, we believe, prove to be a complement to, rather than a serious competitor of, low-cost electricity."

—Portland General Electric Co.

Montana

Montana Power

Population growth in Montana has been phenomenal in the 10 years since the end of World War II. The 1955 figures are not available for the entire state but it is estimated that present population is above the 650,000 mark.

In the Montana Power Co. area alone, growth has been even more pronounced. Recently completed figures based on the residential electric customers served indicate that population in the Montana Power service area now is more than 471,000, an increase of 55% over the 304,000 people living in this area in 1945. Throughout Montana, city growth has been enormous.

There is a solid foundation for the population growth in Montana—the strong and growing economy of the state.

Value of production in Montana in 1954 totaled $862,000,000, with nearly half of it or $439,500,000 coming from agriculture and livestock operations, the state's major industry.

Here are examples of the state's growing economy, showing increases of 1954 over 1945: Mineral production totaled $92,500,000, up 64%. The oil and gas industry's production was valued at $42,700,000, an increase of 117%. The state's lumbering industry was valued at $60,000,000, up nearly five times. Tourist travel brought in $87,000,000, more than five times its value 10 years ago.

The great natural resources that Montana enjoys and its abundance of low-cost electric power and natural gas are important factors in the state's growing industrial potential, which is just beginning to be recognized nationally.

The Montana Power Co. now has approximately 2,500 industrial customers, almost twice as many as those being served in 1945.

New industry—large and small—is being attracted to Montana and more is certain to come.

Montana Power Co. believes there is great industrial potential in the state and that major companies eventually will be interested in Montana for such things as lumber, pulp and paper, chemicals and coal derivatives.

What does growth like this mean to Montana Power Co.? Here are a few statistics: We have increased our electric generating capability 64% in 10 years, from 357,500 kw to 586,000 kw; we have built more than 5,500 miles of transmission and distribution lines; electric sales have increased from 1.9 billion kwh to 3.4 billion kwh since 1945; total electric customers have increased from 92,312 to 137,369, a gain of 49%; our average residential customer today uses 3,241 kwh of electricity per year, 174% more than he used in 1945, and pays 2.24c per kwh for that service or 33% less than in 1945.

Obviously this kind of growth and development will continue in Montana and the aim of the Montana Power Co. is to be ready to meet that growth and development when it comes.—*D. J. McGonigle, general sales manager.*

Nevada

Mineral County Power System

Outlook is good for appliance sales. We do not sell any kind of appliances, therefore have no promotional programs for sales. Television is in the process of being brought here, we expect it this year. No change in industries in sight.—*S. A. Scanavino, manager.*

Sierra Pacific Power

The year 1956 will be an excellent year and our dealers report that they are ready for a banner sales year.

Building will be brisk with a new 200-room hotel, many new motels, and we expect to add some 1,400 residential customers to our system.

We do not employ the medium of sales schemes, promotional campaigns, etc., so we cannot supply you with detailed plans or pictures of our 1955 sales activities.—*A. L. Pierce, manager, new business department.*

Southern Nevada Power

Trend in the community is definitely up, according to figures compiled by

SMUD cooking school pushed local items

the Campbell Realty Co., which maintains complete statistical files on the Las Vegas area.

Population in Clark County is 98,000, an increase of 100% over the 1950 census figure. Population in Las Vegas increased 81.7% to 44,750 in the 1955 special census. Here are just a few figures on one-year and five-year growth respectively: county property tax valuations, 49% ; 200% ; retail sales, Las Vegas, 15% ; 105% ; kwh sales, 40% ; 165% ; bank deposits, 2.16% ; 105% ; building permits, Las Vegas, 20.5% ; 288%.

We have been requested by the Atomic Energy Commission to extend our lines to the proving grounds at Camp Mercury, Nev. This contract is signed by the company and the AEC and involves $554,000.

We are negotiating with a group in the Pahrump Valley area which will mean extending our lines some 60 miles to the west.

We have been informed that the U. S. Lime Products Co. will contract with us to extend our power lines to Sloan, Nev.

As of January 1, W. E. Hughes has been appointed to head up an outside sales force and we are already beginning to feel the results of this effort.

We have contracted with Stearns-Roger Co. to construct an additional steam plant for us, which will have a capacity of 60,000 kw. This plant is to be completed in February 1957 at a cost of approximately $8,500,000.—*Harry Allen, commercial manager.*

Oregon

Portland General Electric

Our wish for 1956 is that the sales pace of 1955 might be maintained but, while the look ahead is rosy, the tint for '56 is likely to be less vivid than the superlative hues of '55.

Total electric energy sales for the year ended Dec. 31, 1955, reached and surpassed the 3 billion kilowatt-hour mark for the first time in the company's history, reflecting a 12.7% increase over 1954. This increase was divided evenly between residential customers and commercial and industrial customers. The number of residential customers reached 200,905, 4,453 over 1954, and their total use of energy increased by 12.8%. Average annual kwh use for residential customers increased by 716 to 7,645.

The outlook for 1956 is for a continuing healthy increase in commercial and industrial construction but a lessening of the rate of residential construction. The advent of natural gas scheduled for this year should contribute to the region's long-range economy by encouraging industrial development with resultant commercial activity and population growth. Natural gas will, we believe, prove to be a complement to, rather than a serious competitor of, low-cost electricity. It is of course to be expected that natural gas will also be promoted for multiple residential use, and stronger efforts will therefore be required to maintain and further strengthen electricity's favored position.

During the year ahead, Portland General Electric Co. will continue its residential wiring and water heater promotional program, which during 1955 resulted in investments of $205,590 by 1,457 homeowners that they might enjoy modern electric living. Evidence shows that this program has contributed substantially to the sales of the various elements of the industry, while at the same time adding to the already high level of customer kwh usage.

Plans for 1956 also call for stepped up advertising and dealer promotion activities in the residential appliance field. Expanded assistance is planned for all elements of the industry—distributors, dealers and contractors. With the foundations that have been laid during the past two years, a continuous successful year is anticipated.

The year 1955 also saw outstanding developments in commercial fields, particularly street lighting. A street lighting modernization program for the entire city of Portland was commenced on July 1, 1955, and is well under way. Some 16,000 modern luminaires will be installed under this program. A continuing program promoting and encouraging the installation of modern safety lighting in other cities and residential districts throughout our service area will also be maintained. During the coming months increased promotional activities are also planned in the fields of commercial cooking and industrial heating.

Rural and farm load and revenue growth maintained a most satisfactory pace during 1955 and the look ahead is one of optimism. Farm revenues, particularly from irrigation, reached a new peak in spite of a wet summer, reflecting a more scientific utilization of irrigation equipment which has been added in the last three years. Some 3,000 hp of additional irrigation load were added, making a total system load now installed of approximately 38,000 hp. Revenues from this load have risen from approximately $65,000 in 1948, to in excess of one-quarter million dollars in 1955. Revenue per horsepower has more than doubled during this period. It is estimated that the company's irrigation load potential in the lower Willamette Valley has only been about one-half realized, but it is expected that the future rate of development will be somewhat slower than immediate postwar years. A more diversified load building program is planned, however, which we believe will insure a continuing healthy growth of rural load.—*C. W. Brissenden, sales manager.*

Utah

Utah Power & Light

The year 1956 will be electrical indusry's biggest year. Our growth in this mountain area in both population and industrially is keeping well ahead of the national average. Our rich treasure chest of natural resources is just beginning to be tapped. There is plenty of low-cost electricity available to serve expanding needs. Population growth in the territory served by Utah Power & Light and Western Colorado Power is approximately 2.5% as compared with 1.5% nationally; employment is higher, department store sales have increased about 9% over 1954 (7% nationally) and percentage of home ownership in the territory is approximately 65% as compared with the national average of 55%. During 1953-55 per capita residential construction in Utah has been about 40% above the national average. Manufacturing has doubled since 1940, nearly twice the percentage increase nationally. Approximately 300 new industrial customers were added to our lines during 1955. Many more new or expanded industrial operations are in the offing for 1956.

Dealers have more potential buyers than ever before. Color will make more sales in 1956. It will play a dominant role in the company's advertising. We

will promote appliances on a regular schedule with a "buy from your dealer" tag line. It will also display merchandise at its state and county fair exhibits and in home shows, theater demonstrations, etc. For the third year it will sponsor advertisements in national business publications telling the advantages to industry in locating in the area.

Utah Power & Light domestic rates are approximately 20% below the national average. The company last year increased installed capacity 19%.

The company will cooperate in promoting adequate wiring. Its dealer consultants and home service staff will help in the sales job ahead.

Forecasts indicate that sales of appliances will be up; that regional growth and new designs will push up commercial sales; that expansion and automation will bring record sales in industrial equipment.—*W. A. Huckins, manager, new business department.*

Provo Electric Power

This year, as in 1955, we do expect a normal increase in power sales. We forecast for 1955 a 7.5% increase in power sales. The close of the year showed an increase of 7.7%.

There will not be any expansion through industrial changes or additions. We are not in an industrial area due to our limitations as a municipal producer; however, the industries now established in Provo City will continue to use more power as production increases.

We expect to increase our sales through commercial and residential expansion. We certified more than 50% of the new homes built in Provo last year. Our sales promotion for 1956 includes added expenditures through the media of "Electricity In Building" which will be distributed to all architects, loan and appraisal agencies and building contractors.

The building program, which has been in effect since 1952, at the Brigham Young University, will continue to expand for some time. The power consumption increased from 384,000 kwh in 1954 to 511,200 kwh in 1955, or an increase of 33.12%.

The forecast for 1956 is very good and should be consistent with the growth for 1955.—*Sharp Gillespie, superintendent.*

Washington

Clark County PUD

We are looking forward to a successful year during 1956. Home construction is going on at a steady pace and we would estimate the construction of 1,000 new homes. This utility welcomes electric heat and expects to add 500 to 750 new heat customers during the year. A range and water heater program is planned during which the district will subsidize each to the extent of $25 if it replaces flame-type cooking or water heating and the house is not already wired.

Average residential kilowatt-hour consumption for 1955 will exceed 8,000 kwh. No major industrial expansion or contraction is in sight. Industrial use of electric energy maintains a steady growth, most of it coming from expansion or modernization of existing plants.—*C. A. Penney, commercial manager.*

Cowlitz County PUD

I believe our most outstanding achievement for 1955 was that fact that the average kilowatt-hour use per residential customer for our entire system was over 10,000 kwh per year. This is especially significant when you consider the fact that Cowlitz County Public Utility District's service area covers the entire county and that over 99% of the residents of the county are served by us.

On June 1, 1955, we reduced our commercial cooking and heating rate to .008c per kwh and made it available for commercial cooking, heating and water heating. This reflected a reduction of nearly 25% in our cooking and heating rate for commercial use. The response was spontaneous. Two fine, new restaurants have been constructed recently and they have both been all-electric. Electrical heating has also become popular for small commercial buildings in this area, particularly single-story clinics and office buildings.

Our system peak increased from 76,080 kw in 1954 to 95,990 kw in 1955. Our estimate for 1956 is 111,000 kw. Industrial growth in the community has been steady and residential growth continues at a rapid pace. During 1955 we connected approximately 400 new homes to our lines, over 75% of which were electrically heated. Two major new industrial plants under construction are the R & W Paper Co. plant which will manufacture glasine paper and will require 4,000 kw, plus a chemical plant being constructed by the Weyerhaeuser Timber Co. to manufacture chemicals for its pulp and paper mills, which will eventually require 20,000 kw.

We plan to tie in with the nationwide "Live Better . . . Electrically" campaign with the major effort placed on adequate wiring.—*Lacy M. Peoples, commercial manager.*

Grant County PUD

Grant County Public Utility District is located in the Columbia Basin Irrigation Project, and serves 62% of the project area. As of 1955, 246,849 acres of land in the project can be served by irrigation water and an additional 54,533 acres or 676 more farm units are scheduled to receive water in 1956.

The project is developing at a rapid rate with the 600,000-acre program scheduled for completion by 1961. The increased farming activity has stimulated business in all segments of the economy, and the year 1956 will show a substantial increase in business activity over 1955.

In addition, the Boeing Aircraft of Seattle has located in this area and now is employing approximately 1,000 persons. Several large food processing plants have indicated interest in the

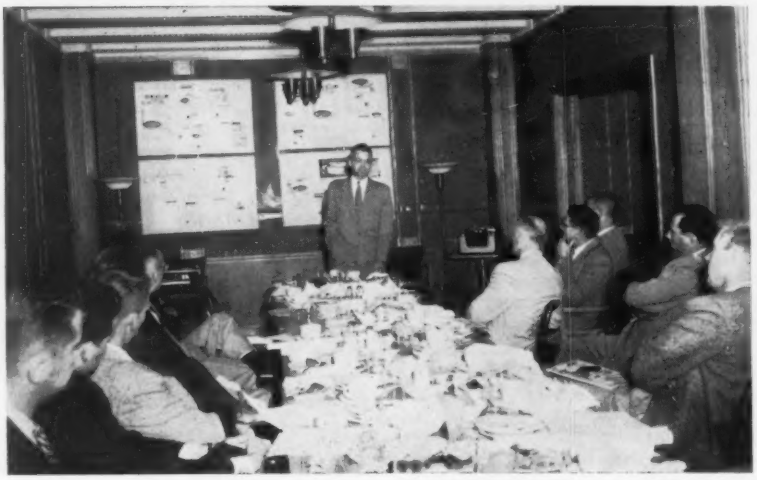
Reddy Kilowatt is hired man at Reese dairy farm in Cache Valley; is paid $35 a month. Tour of facilities on this and other farms was sponsored by Utah P&L for civic leaders

area with prospects of early plant construction. All these are favorable factors for the coming year.

The utility has promoted use of electric heat in both residential and commercial buildings. We now have approximately 35% saturation of electric space heat among our residential consumers on a county-wide basis. One area of the county has approximately 75% saturation, and about 90% of new residential construction is using this method of heating.

Use of sprinkler irrigation on farms in this area has also shown a decided increase and we look forward to a continued expansion of this method of irrigation.

Considerable effort will be made during the coming year to promote the use of heat pumps for both heating and cooling. Climate conditions in the area are conducive to this type of installation.—*Axel E. Strom, director of utilization.*



Industry promotion of freezers was success in Spokane. Here utility and food men meet

Puget Sound Power & Light

"Operation Livewire," Puget's 1955 sales promotion program, lived up to its slogan "Look Alive in 55." Annual kwh use per residential customer was 6,413 for the year ending Nov. 30, 1955, compared to 5,794 kwh in 1954, an increase of 619 kwh or 11.07%. This 619 kwh compares to an estimated increase of 518 kwh for the year. In addition, Puget again added about 10,000 customers to its all-electric rate making a total of about 110,000 residential customers who cook their food and heat their water exclusively with electricity. This group of customers has an average annual kwh use of 9,011 for the year ending November 30, 1955. Commercial and industrial revenues are also running well ahead of 1954.

Puget's 1956 program looks equally encouraging. We have retained the services of a nationally recognized firm of management consultants to work with us in developing our load-building program. Economic forecasts for Puget's service area continue to indicate prosperity which will be conducive to our continued growth. Radio, newspaper and TV programs started in 1955 will be continued and expanded to some extent in 1956.—*C. A. Scheyer, general sales manager.*

Seattle City Light

Seattle continues its rapid expansion —in area, in population, in commerce and in industry. Arterial streets and highways are now illuminated by 15,000 mercury-vapor units, which have reduced accidents in traffic and enhanced Seattle's reputation as the best lighted city.

Many new commercial and industrial plants were constructed and many existing plants were rebuilt or expanded to keep up with growth. The Bon Marche, Frederick & Nelson and Rhodes department stores have or are constructing new plants or additions to their present buildings, virtually doubling previous floor space area.

New construction generally includes many new public and parochial schools, dormitories and hospitals. Large new buildings and industrial plants include an 18-story, 194-unit apartment building with electric ranges; Pacific Telephone & Telegraph six-story building; U. S. Terminal Postoffice (a $6,000,000 plant, three stories); Olympic Portland Cement Co. building; Carnation Co. plant. Boeing Airplane Co. will add a 3,000-kw supersonic wind tunnel and a new 15,000-kw additional plant.

In 1955 Seattle City Light sales of electric energy approximated 3¼ billion kilowatt-hours with a yearly peak of 733,000 kw, topping sales in 1954 by 8.89%. Prospective growth in 1956 appears to continue along this same curve.

We will continue our residential program of electric modernization of the older homes. This promotion pays the customer $30 for installation of an electric range replacing flame-type stove and $25 for installation of electric tank water heater, 50-gal size or larger, that replaces flame-type water heating. Through this promotion electrical and plumber dealers sold 1,878 electric ranges, 2,449 electric tank water heaters in 1954, and 1,911 electric ranges and 2,328 electric tank water heaters in 1955.

Our revenue producing program for 1956 includes a continuance of the 1955 commercial electric cooking and commercial electric water heating programs. Promotion allows a wiring and plumbing installation subsidy based upon increased revenue. In the years 1954 and 1955 a total of 8,535 kw of commercial electric cooking and 3,243 kw of commercial electric water heating were added to the lines.—*J. D. Gawne, electric sales supervisor.*

Snohomish County PUD

Business continues its upward trend in our operating area and record-breaking levels are expected for the coming year. Five additional wood product companies are expected to be connected to our lines in 1956. There is also increased activity in mining in the eastern part of the county. Due to favorable location geographically several inquiries have been received by our Chamber of Commerce from industries in the petrochemical field, who are seeking locations in the Northwest. New housing with a continuing increase in the use of electricity in the home, on the farm, in retail business and also the growth of industry point to a steadily increasing demand for electric energy.

To meet these increasing demands the district budgeted $3,771,000 for improvements and additions to plant during 1956. From the standpoint of a promotional program the district will support a regular schedule of institutional and promotional advertising using the radio and daily and weekly newspapers operating in our area.—*A. S. J. Steele, manager.*

Tacoma City Light

Business outlook is favorable and it is anticipated that the advent of natural gas will create, generally, among

San Diego Electrical Bureau's shows again drew record crowds; netted many sales

all dealers, more keen competition and greater activity in appliance and space heating sales. We will continue to give financial assistance toward the replacement of flame-type domestic appliances; also to encourage the changeover from sidearm to automatic electric water heaters.—*H. A. Cole, superintendent, light division.*

Washington Water Power

All indications point to a prosperous 1956 for the electrical industry in the Inland Empire. In fact, the entire outlook for this area is encouraging. Local forecasts are for slightly less sales gains during the coming year than were experienced in 1955. However, the electric industry should continue to enjoy a more favorable increase.

The Washington Water Power Co. in cooperation with the Inland Empire Electrical League plans to carry out full-fledged promotions based on the EEI and NEMA calendars for 1956. These promotions will follow the patterns established during 1955. They will be quarterly campaigns, utilizing some of the promotional material available from EEI and tailored to fit the problems of our service area.

Emphasis on the rewiring problem for existing homes and promotion of the 115-amp "Miracle Cable" service entrance cable will be the counterpart of our 1955 200-amp "Expendable Wiring" program. It is designed to offer a solution to the wiring bottleneck which has become a major deterrent to the dryer sales.

All major appliances will be featured during the year. Particular plans for each promotion are not yet available. However, the first quarter is devoted to laundry equipment and, in addition to the dryer advertising, strong wiring tie-in is the main feature of the campaign.

Final sales results for 1955 are not yet available but will be ready soon. Copies of the November 1954 and November 1955 Dealer Sales Progress Summaries show the tremendous increase for the 11 months. Reports from dealers assure us that December sales will swell these totals.—*K. I. Jack, general sales promotion and information manager.*

Hawaii

Hawaiian Electric

We expect new residential construction to continue on about the same high level as last year when 4,026 new residential units, including apartments, were added. Approximately 86% of all new residences will select all-electric equipment, including water heaters, electric ranges, electric refrigerators and small appliances.

Our industrial development section is well under way in an attempt to strengthen our local economy through addition of small industries to existing agriculture, tourist business and the military activity. If Standard Oil Co.'s plans to locate a refinery here materialize, this will be a great boost to industry and, as Dr. Leonard Baver, director of the Hawaiian Sugar Planters Assn., has expressed it, we can expect many weddings between sucrochemistry and petrochemistry.

The 1956 advertising program will be divided into two main divisions, utility and institutional. The former includes wiring, lighting, the all-electric home, home service, electrical living, PCEA special promotion, subdivision promotion; the latter a series of 10 advertisements devoted to industrial and cultural advances in the community, continued sponsorship of the Honolulu Symphony's radio broadcasts with accompanying advertising and Hawaiian Electric's Music Scholarship Awards.

To keep before the reading public the one idea that electricity is its best friend in the household, the advertising program will stress these points: (1) the most desirable way of household living is the all-electric way; (2) appliances, large and small, powered by electricity are superior to any other kind; (3) the benefits of electrical power and illumination depend upon their proper use and the most good can be obtained from modern electrical equipment only through adequate wiring and knowing how to arrange lighting most effectively both indoors and outdoors.—*Harry P. Field, vice-president and commercial manager.*

Canada

B. C. Electric, Vancouver

An outstanding event of the year was the signing of a contract to serve the Powell River Co. at Powell River, B. C., with a block of power of between 12,000 and 18,000 kw. With the consent of the PUC the company also took over service to the Powell River area, population about 10,000. The company also undertook to serve Texada Island. The commission has agreed to sell its Sechelt system to the company in 1956.

A large increase in kwh sales is accounted for in part by an increase of 380.8 kwh in average use per customer, the second largest gain in our experience. Customer growth is in excess of the 1954 gain, aided by acquisition of approximately 2,000 accounts in the Powell River area.

The dollar volume of appliance sales reported by dealers will be the highest ever recorded. Due to very competitive situations customers enjoyed relatively low pricing of appliances throughout the year, with ample stocks to choose from.

For the first time since World War II, the company promoted a display home to assist the sale of adequate wiring, better home lighting and full electric appliance installation. This home in the British Properties was open to the public from Aug. 4 to Oct. 23 and had an attendance of 65,518. The promotional value is a long-range one but some of the ideas and features of the home are already being incorporated into homes being built, both

Tacoma City Light employees destroy sidearm water heaters collected in campaign to rid system of undesirable load-building devices. Right, Hawaiian Electric home economist, Mew Lun Hee, with Calvin Young, Freezer Freddy in Heco's tie-in campaign

by individuals and speculative builders.

Total amount of promotional literature distributed was only a few short of 100,000, 70% of which was used at the East of Living Home. Ten lectures on lighting and wiring were given to a total of 181 home economics students in addition to our regular home service program.

Residential electric heating continued at steady growth, increasing from 1,654 to 2,380 accounts. Interest in apartment house, auto court and hotel electric heating continued during 1955 and numerous estimates were prepared.

The construction industry enjoyed another boom year, with the bulk of the 5,558 housing units added in Burnaby, Richmond and on the North shore, due to lack of available NHA lots in Vancouver. Electric extensions to serve this new housing cost $610,000. More than 2,856 building lots were supplied with electric service and in addition several major subdivisions were negotiated which, when fully developed, will open up another 1,400 lots. The housing industry is expected to be as active if not better in 1956 than in 1955.

Industrial expansion continued at the high level set in the past two years, with a net gain of 29,346 hp. Load growth last year was nearly equally divided between new customers and existing customers. This is a new trend since formerly the bulk of additional load was from existing customers.

In general the lumber industry had a very good year with very little time lost. A number of new manufacturing plants were opened or nearing completion by the end of the year.

Promotional efforts in lighting centered in planned wiring and lighting service offered to customers, with a total of 1,033 in industrial and commercial, residential and kitchen. In commercial cooking 2,704.48 kw were added; in water heating, 850.5 kw of new installations. Total number of street lights connected to our system is 23,515, of which 13,780 are ornamental lights. A total of 1,346 was added during 1955. Trend toward mercury vapor is gaining impetus with an increase of 716 to 1,406.—*C. A. Manson, assistant general sales manager.*

B. C. Electric, Victoria

The business outlook for 1956 is very promising. Construction will continue to play a vital role during the year. Not only is there a large volume of work to be completed, but new projects constantly are appearing. New developments in defense construction in this area will continue to afford employment for a large number of skilled workers.

A feature of present and future progress is that new developments are taking place in areas far removed from accepted industrial centers. Growing lines of communication and transportation are fanning out from and leading into formerly locked communities to tap a vast new potential and offer new sources of provincial economic unity and strength.

Washington's approval of large-scale imports of Peace River natural gas into U. S. Pacific Northwest will set in motion a development program that in time not only will transform the economic picture of the northeastern and north central sections of B. C. but will exert a profound impact on the whole B. C. economy.

Plans for promotional programs for 1956 include:

1. To encourage and assist in the promotion of cooking schools and other group presentations by distributors, department stores and food supply houses, wherever electrical cooking is part of the program.

2. To encourage smaller group demonstrations of dishwashers, dryers and automatic laundry equipment in dealer stores. Home service personnel will conduct demonstrations in cooperation with dealers and distributor salesmen.

3. To cooperate with promoters of fairs and exhibitions so that electrical appliances will be well represented.

4. To organize and conduct sales contests of various types so that dealer sales personnel will be encouraged to draw attention to less known items (dishwashers, disposers and automatic laundry equipment).

5. To conduct consumer cooking schools.

6. To assist in staging manufacturers' and distributors' presentations of new merchandise and to take an active part in such programs.—*A. W. J. Smith, sales manager.*

"This is definitely a frontier area . . . in the sense that people are coming . . . to settle . . ."

—Matanuska Electric Assn., Palmer, Alaska

ELECTRICAL WEST SALES GUIDE © FEBRUARY 1956

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

Talk of margins

As elsewhere talk in the West among industry groups turned to distribution patterns, costs and margins. G-E's action in late December cutting prices on houseware items and reducing distributor margins and dealer markups was followed by announcements of policy by other manufacturers. Sunbeam said it would reduce prices on competitive models but would not cut margins. Landers, Frary & Clark took the same stand for the Universal line. Toastmaster reduced the price on one toaster model; took an ad to remind retailers and wholesalers that there was no change in profit margins on its regular line. Casco ran an ad on fairness; said it would maintain full discount to wholesalers; urged them to maintain commissions to salesmen. Westinghouse said it would not meet the G-E cuts.

Some reactions

While this move to crowd margins, along with recent mergers and a trend toward fewer and bigger manufacturing operations, caused general uneasiness, many were "waiting to see" and some were even optimistic. A speaker at the NARDA national convention said that the list price must equal what the consumer will pay, found the new prices a lot closer to reality. One Western distributor, Ken Hampton, Valley Electrical Supply in Fresno, said that better retail merchants are accepting the fact that they will be able to operate successfully on closer margins and bigger volume if they have top brand names and the models people want—not those factory engineers design to be most easily built.

Big vs little retailers

Also observed at NARDA's conventon in Chicago last month (which discounters attended as members for the first time) was a tendency on the part of small retailers to feel that the real struggle was with big retailers, not discounters. Outgoing President Price commented that the discount house came into being as a counterbalance to distorted retail margins and that "these margins weren't distorted until we came into volume retailing. The discount house was a natural development..."

Fair trade for radios

Other news of G-E last month were to announce that it would fair trade radios, which were taken over by its small appliance department; report that it would market a TV line under the Hotpoint label.

Coming up

San Diego Bureau of Home Appliances will hold its 12th Annual Spring Fair of Modern Home Ideas in the Electric Bldg., Balboa Park, April 24-29.

Warnings unheeded

Bank credit managers are warning about too much credit and President Eisenhower has asked for stand-by controls, but there seems to be little or no effect of these storm warnings at the marts. Interpretation of various reports is somewhat stymied when the bankers' caution is placed side by side with opposition to controls by Rep. Jesse P. Wolcott (R-Mich.), ranking Republican on the House banking committee.

Fresno market

The San Joaquin Valley Merchandise Mart sponsored last fall by Fresno C of C's Commerce and Trade Department was so successful that a spring counterpart will be held in the civic auditorium on Feb. 26 and 27. Designed for appliance and furniture dealers who do not get to the San Francisco and Los Angeles showings, the Fresno market follows up these two; puts special emphasis on products best suited to the local climate and region. According to Ken Hampton, chamber committee chairman, 20 firms had signed up for space by Feb. 1. The fall show did a $30,000 volume with 15 exhibitors and some 80 lines.

Parade of Homes

Arizona Public Service Co. made an effective promotion of its services and at the same time helped push a community project when it sponsored a builders' contest in connection with the Phoenix Parade of Homes. The Away to Waikiki Contest offered a trip for two to the builder who made the best use of the utility's services. Judging was on wiring, light conditioning, air conditioning and completely equipped kitchen-laundry areas. The 18 homes each by a different builder were shown in a big Parade of Homes Jan. 15-29. Admission fee was 50c; provided were free parking; a playground with attendant for children; a concession stand.

Good business

"There's No Business Like Our Business" is the name of a road show that Pacific Gas and Electric Co. is taking to its employees throughout the system. Made up of a movie, slides and a live skit, the show is designed to acquaint all employees with the company's activities and objectives. The importance of service is emphasized with expressions like "12,587,000 tons of dishes washed by families in our territory each year; 5,800,000 tons of laundry handled each year—2½ times the weight of the San Francisco-Oakland Bay Bridge." O. R. Doerr, vice-president in charge of sales, announced the program.

Removing regulators

A new sales department has been instituted by Southern Nevada Power Co. Since the first unit of the new Clark Station went on the line, the company can safely encourage all-electric homes and is carrying the message to builders and electrical contractors. Additional generating capacity also eliminates the need for peak-hour heat regulators in homes and commercial buildings that meet certain insulation standards. Removal of the regulators is being done by the company at the request of customers.

All-out drive

Northern California Electrical Bureau is sponsoring a laundry dryer campaign throughout its service area during March. Feature is the offer of a 10-day free home trial to convince the sceptical housewife that a dryer can make her work easier. The promotion is being supported by power company, manufacturers, distributors and retailers of the area. PG and E is giving it full advertising support, including bill stuffers, billboards and newspaper space.

Boosts dryer sales

Boosting dryer sales, Colorado Farm Power Council is circularizing a promotion program and contest sponsored by Southeast Colorado Power Assn., Southern Colorado Power Co. and San Isabel Electric Assn. Inc. The council also offers free help and a low-cost promotional package that includes a give-away dryer and dealers displays.

More on dryers

Intermountain Electrical Assn. is offering $450 in prizes for window displays featuring the automatic electric clothes dryer. This is a feature of its February dryer campaign, carrying the slogan, "No trick...drying's slick!"

Three-way profit

Arizona Public Service Co.'s cooperative promotion on automatic fry pans netted 3,500 sales, had a three-way benefit in increased dealer sales; increased electric revenue; ready cash for utility employees who helped with the selling and received commissions. Public Service employees in selected areas cooperated with local appliance dealers; made after-hour door-to-door solicitations; were credited with 75% of the sales made during the 30-day campaign.

Faster cooking

While not disputing test figures on which G-E based its ad headlined, "Now...Cooks Faster than Gas," the American Gas Assn. wired all members urging protests to the manufacturer. A G-E executive was quoted in "Electrical World" as saying: "If the gas industry plans to go to higher burner inputs, they will suffer rapidly declining efficiences. And no matter what the gas industry does they will never be able to compete in speed with the new electronic ranges coming on the market."

New officers

New officers of Contra Costa Appliance Assn. are: Ivan Whitver, president; Ted Maser, vice-president; Ray Garrett, secretary-treasurer...Dick Searle, Dick Searle Appliances, is new president of the Monterey Peninsula Gas & Electric Appliance Dealers Assn... Walter Brooks will head up the Salinas Valley Gas and Electric Appliance Dealers Assn.

New manager for SRVEA

C. J. (Brad) Bradford was appointed secretary-manager of the Snake River Valley Electrical Assn., replacing Vic Goertzen, who resigned to go with Idaho Power. Bradford was sales promotion specialist for Reilly-Atkinson Co., Boise; had been with C. C. Anderson Co. and Pabco during his 12 years in the Boise Valley. SRVEA area dealers wound up the year by selling nearly 2,700 units of four major appliances in a single month. This was 10% of the year's sales.

Will lead parade

The Pacific Coast is going to lead the parade in color TV set sales, Don Mitchell, president of Sylvania Electric Products, told a San Francisco press conference. 25% of the sales of the nation will be made in California and his guess was there would be 300,000 total sold in 1956; in 1950 there were less than 50,000 sold. Even though too tricky to tune for best color results, he feels the public will buy and in a year and a half the engineers will learn how to lock the color controls and produce sets to sell from between $500-700. Then real quantity sales will come. He was optimistic that 7,000,000 black and white sets would be sold in 1956 and no one is worrying any more, he said, about color affecting black and white sales.

Northern California Electrical Bureau will sponsor a series of meetings to promote the Live Better...Electrically program in its area. The meetings will start about March 10. | Bureau sponsors

Honolulu Electrical Products Co., incorporated to take the place of Hawaiian Electric Supply, is planning a million-dollar building program. Construction on a five-acre lot is expected to start late this year. | Will build

Two new things in radio will soon be put out by Sylvania. Sounds fantastic, but promises to sell well—a portable radio and geiger counter and compass. Will entertain the uranium hunters while on their boring search for pay dirt. The other is a portable radio with an intercom for use in the home. The remote pickup can be placed in a child's room, kitchen, at the front door, and the radio's amplifier used for the intercommunication. | New in radio

Sues, Young & Brown Inc. showed 1956 Zenith products at an open house in their showrooms at Los Angeles...James E. Herbert, Motorola national sales manager, is heading an executive team that met with distributors in Los Angeles Feb. 1 and Seattle Feb. 3. New products were introduced. | Notes on the trade

Philco is looking at the custom kitchen trend with optimism—and with appliances that can be added one at a time. Example No. 1 is an elevator oven that can be raised electrically to 15 in. above the work surface, and can be lowered while food is cooking so the top becomes work surface. The custom sectional idea is carried out in freezers and refrigerators that are companions to the oven. The two units can be mounted on cabinets, beneath a work surface or on top of each other. Doors can be painted any color or can be brushed chrome. All appliances can be built-in, giving a dual selling feature. | Custom kitchen

Admiral Corp. has taken the first step toward transistorizing TV receivers. A tiny selenium phase selector replaces tube 6AL5...Pastel shades against a light gray background are Servel's answer to color trend. The 1957 refrigerator models make their appearance this spring. | New products

Thermador has a new built-in double oven with rotisserie. The two units, in a single frame, are less than 45 in. wide, yet each has nearly 6,500 cu. in. of usable space...Hotpoint is introducing a new electric water heater with Perma-stone cement lining for areas with highly corrosive water...Hoffman has a full line of 21-in. color TV receivers with California styled hardwood cabinets. | More new lines

Sylvania Electric Products has announced plans for a new 86,000-sq-ft warehouse and sales office in Los Angeles to serve southern Calfornia and nearby states...New regional sales office of Whirlpool-Seeger Corp. in the West is at 6253 Hollywood Blvd., Hollywood 28, Calif. Peter N. Prussing is regional manager...Anderson-O'Donnell Co., Denver, will represent Cresent Industries Inc. in the Rocky Mountain area. Products are hi-fi phonographs, recorders and record changers. The territory includes Colorado, Utah, New Mexico, Arizona, Idaho, Montana, Wyoming, western Nebraska and El Paso. | New quarters

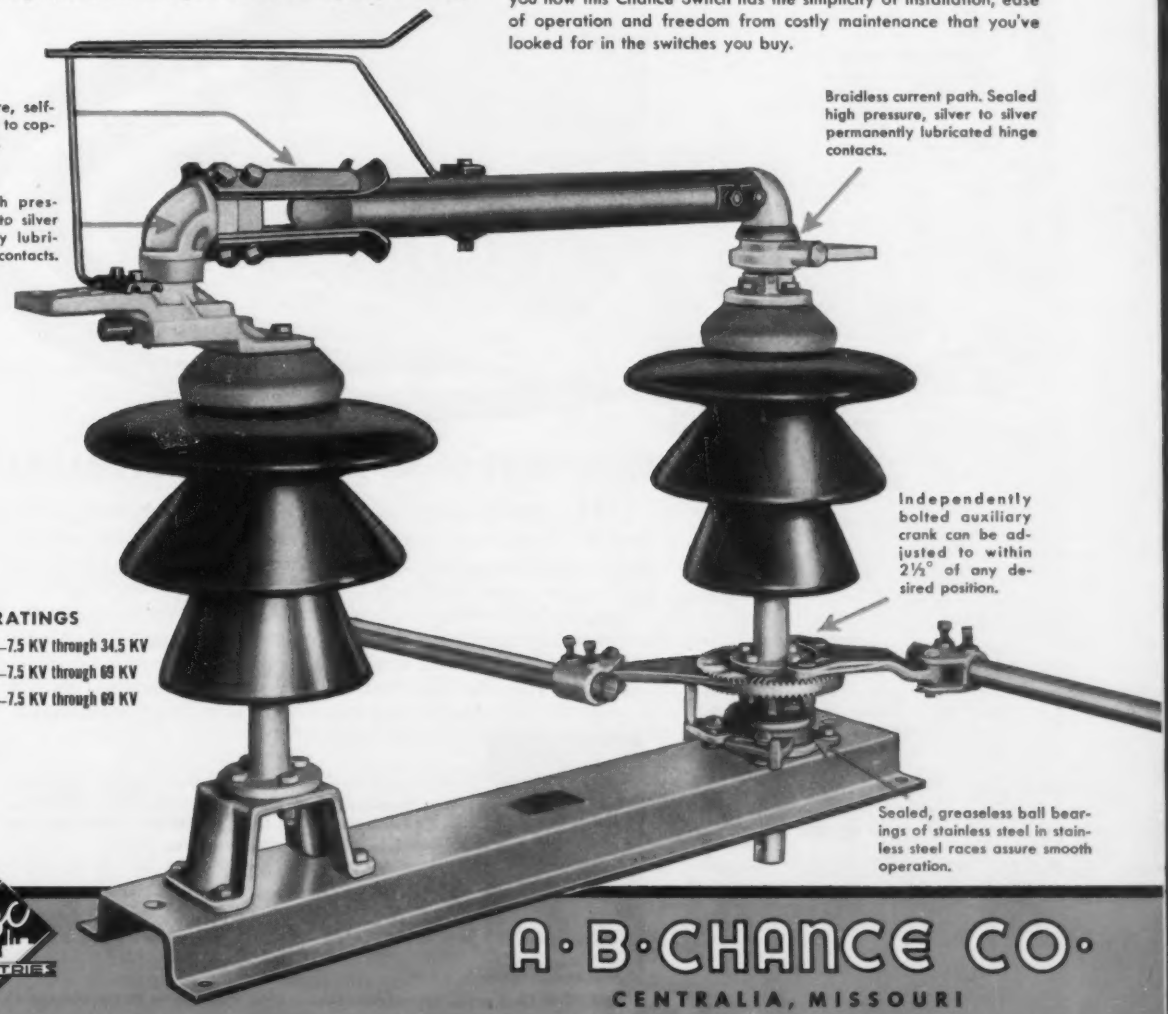
Have you seen the NEW Chance Side Break Switches?

Desk-top model demonstrates features that make this high-pressure contact switch easy to install, easy to operate, and able to withstand extremely high fault currents.

TOM CURTIS, Chief Switchgear Engineer, and CHUCK LIMING, Switch Sales Manager, discuss features of quarter scale demonstration model of new Chance Type S Switch.

The Chance Type S Side Break Switch has everything that utility engineers have asked for in a ruggedly-built, economical switch for sectionalizing, disconnecting, by-passing and isolating applications. It was designed to combine ease of installation and operation with the high mechanical strength and thermal capacity necessary to withstand, without damage, the extremely high fault currents possible on today's systems. It passes every test.

If you haven't seen it, a letter, post card, or phone call will bring a Chance representative with a desk top demonstration to show you how this Chance Switch has the simplicity of installation, ease of operation and freedom from costly maintenance that you've looked for in the switches you buy.


High pressure, self-wiping silver to copper contacts.
Sealed high pressure, silver to silver permanently lubricated hinge contacts.
Braidless current path. Sealed high pressure, silver to silver permanently lubricated hinge contacts.
Independently bolted auxiliary crank can be adjusted to within 2½° of any desired position.
Sealed, greaseless ball bearings of stainless steel in stainless steel races assure smooth operation.

RATINGS

400 Ampere—7.5 KV through 34.5 KV
600 Ampere—7.5 KV through 69 KV
1200 Ampere—7.5 KV through 69 KV

ABC INDUSTRIES

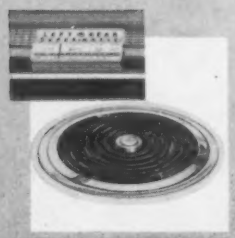
A·B·CHANCE CO·

CENTRALIA, MISSOURI

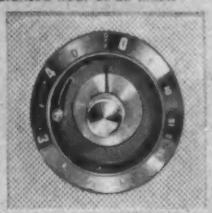
San Francisco, California • Pittsburgh, Pennsylvania

C536-9

Super-Matic



AUTOMATIC SURFACE UNIT . . . fry, boil, saute, pan broil and grill with thermostatically controlled, balanced heat at all times.



AUTOMATIC MEALTIMER . . . Select desired Super-Matic heat and set MEALTIMER for time food should cook—on surface or in deep well. Food cooks at the proper heat for the proper time, then it shuts itself off . . . automatically!

AUTOMATIC FRENCH FRYER, DEEP-WELL COOKER . . . makes soups, stews, economy meals—even bakes under controlled heat.

AUTOMATIC CUSTOM COOKER-SERVER . . . it's a frying pan, a grill, a waterless cooker, even a Dutch Oven. Precision timed and heat controlled by the Super-Matic Calrod® Unit and Mealtimer.

Again, Hotpoint

Hotpoint

ELECTRIC RANGES

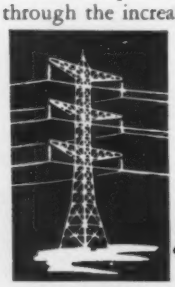
—Building Increased Utility Revenue With Advanced Automatic Electric Cooking!

SUPER-MATIC COOKS ALL WAYS...AUTOMATICALLY!

Hotpoint Electric Ranges cook everything in the book—*automatically!* With a range line already loaded with super-cooking features, now they can fry . . . bake . . . broil . . . simmer . . . stew . . . deep-fry . . . grill . . . *all automatically* with Hotpoint's new SUPER-MATIC!

Hotpoint's Super-Matic offers the homemaker undreamed of convenience . . . unmatched freedom from time-consuming cooking chores . . . *plus* faster, more precise cooking.

And Hotpoint's Super-Matic offers utilities expanded revenue through the increased demand Super-Matic is building for automatic electric ranges.



Have your Hotpoint Distributor Show You The Complete NEW Hotpoint Range Line for '56 . . . Six New 39" Models . . . Two New 30" Models . . . And Five Beautiful Hotpoint Colortones, As Well As Classic White.

Looks at Tomorrow, Today!

HOTPOINT Co. (A Division of General Electric Company) **5600 West Taylor Street, Chicago 44, Illinois**

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Busy year starts

Only house building among all types of construction shows a continued decline from the fabulous rate of earlier last year. Other fields of construction, temporarily delayed by "unusual" weather in the West, promise to boom again in the spring as the backlog of plans and projects moves out from the engineers' drawings to the construction starts.

Credit lengthens

Brought back are 30-year terms on mortgages by FHA, evidently to prop up housing. Still, as Business Week points out, longer to pay does not make the loan easier to get if money is tight. Likewise, home building costs have grown 150% since the late 30s.

Demands assured

With migration Westward continuing at a rate of thousands per day and big industrial developments announced from many sectors of the West, oversupply of housing is not likely for some time to come. Spring should see all construction energetic and a shortage of electricians to do all the wiring.

Look for men in U. S.

In fact, IBEW is said to be conducting a mass manpower hunt in British Columbia to fill orders by contractors for 600 journeymen and 1,000 linemen for projects throughout that province. There is even talk of importing electricians from the U. S. on a temporary basis. Big projects by B. C. Electric, Aluminum Co. of Canada and radio stations are creating the demand. Rates run from $2.55 per hour at Kitimat and $2.37½ an hour with room and board free on some other projects.

Up again

Copper wire prices went up as we went to press last month and since then all electrical products using copper have been adjusting upward also.

To qualify

Public works contractors' licenses are now required of all contractors bidding for work to tax-supported agencies of any sort in the State of Idaho (except federal). A new law, effective Jan. 1, prohibits such agencies from getting bids or awarding jobs to any contractor not so licensed, even for simple maintenance, new wiring or new construction.

Dates transposed

Southwestern Section's annual meeting place will have to be shifted from the originally selected Hoberg's resort in Lake County, Calif., because of conflict of dates. Timing of the annual meetings is arranged by the IAEI in rotation to allow national officers and visitors to make a sequence tour of the five section meetings. Dates for the Southwestern Section meeting have been changed to Sept. 17-19 and some other northern California location will be selected. Northwestern Section dates will precede on Sept. 10-12 in Salt Lake City.

Put off a month

The adequate wiring show and conference in Santa Barbara, according to Harry V. Dobson, chairman of the planning committee, will be held at Mira Mar Convention Center on 101 highway outside of Santa Barbara on Friday, March 2. The show will open in the afternoon and the public will be invited. A dinner in the evening will be for architects, building contractors, subdividers, building and loan officers. The program will feature talks on adequate wiring and kindred subjects. It is being sponsored by the NECA chapter, IBEW union and with the cooperation of Southern California Edison.

Added promotion

A Commercial and industrial adequate wiring program as well as continuation of the residential and farm wiring programs was decided upon by the National Electrical Manufacturers Assn. at its annual convention. It will be coordinated with the National Adequate Wiring Bureau. First in 1956 will be a market study to select from the many different types of commercial and industrial structures those in greatest need of immediate attention. The industry committee on interior wiring design will be asked to develop standards of adequacy for both commercial and institutional structures . . . In the residential field the emphasis will be on wiring modernization during 1956. Details of this campaign will be announced at the 12th annual national adequate wiring conference in Chicago Feb. 23-24.

Herb G. Ufer at least was elected honorary president of the International Association of Electrical Inspectors by the executive council of that organization following his resignation of candidacy for president because he is no longer an active member. Feeling about his resigning his chance at the presidency ran very high in the Southern California Chapter meeting in Pasadena Jan. 25, one motion even being made to secede from the IAEI. Where he is known in the West and honored for his untiring work on behalf of IAEI, there never was any doubt of his eligibility on sheer merit. Some question was raised in the middle west where he was not known and rather than embarrass the association he resigned his candidacy.

Deserved honor

L. O. Trim, chief electrical inspector of Burbank, was elected president of IAEI in Ufer's place. Trim has long served the Southwestern Section and southern California chapters. H. S. Morr, manager of the Utah Fire Rating Bureau, Salt Lake City, was elected first vice-president to replace the late E. B. Morrison of Portland.

New selections

A special price for 220-v wiring for installation of electric dryers is being offered by the Phoenix Chapter of NECA in cooperation with the Appliance Merchandisers Assn. campaign on dryers through February.

Lower the obstacle

"Miracle Cable" is the catchy name being given to No. 2 SE flexible cable with RH insulation, rated at 115 amp, in a campaign by Washington Water Power Co., Inland Empire Electric League and Spokane Chapter of NECA to sell the public on rewiring jobs. Used with a heavy-duty (125-amp) meter socket, the ads say that service entrance rewiring costs can be cut as much as $50 by use of this cable. The drive is aimed to enlarge the electrical capacity of existing homes and open a big field of appliance prospects. The first ad brought 33 phone calls to the Spokane office alone. The calls are referred to electrical contractor members of the league. Utility representatives give customers a free wiring check. The "Reddy Kilowatt hookup easy payment plan" is offered as a means of financing home wiring.

Glamour added

Hawaii Chapter, through its earnest and persistent spokesman, John Thomas Carey, has pleaded for the Southwestern Section meeting for years. Carey, founder of the chapter and chief electrical inspector of Honolulu, was voted back as chairman and will be installed as such at the annual dinner meeting of the chapter in Pearl City, Oahu, Feb. 11. Samuel Haae is vice-chairman and a new secretary-treasurer, Francis M. McKinney, instructor in electricity at Honolulu Technical School, replaces E. Warren Small. For the inaugural dinner, it was announced that IAEI President L. O. Trim of Burbank and IAEI Secretary Charles L. Smith of Chicago would be guests of honor. Carey and McKinney are conducting a drive for membership to warrant formation of a section for the Islands.

Back in the saddle

Sylvania's president, Don G. Mitchell, in San Francisco for a sales management conference, announced that a new warehouse and sales office to act as the regional and district office for Sylvania in northern California was being started in the Millsdale tract at Adrian Road adjacent to Bayshore Freeway below San Francisco. The $100,000 facility will cover six acres and have 80,000 sq ft of warehouse and office area, about twice the size of the present Emeryville warehouse and sales office. The Emeryville facility may be kept but the San Francisco headquarters of Gar Morse will move to Millsdale some time late in the year, probably September. Meanwhile, the new Los Angeles warehouse in the central manufacturing district of similar size will move the Los Angeles offices about June.

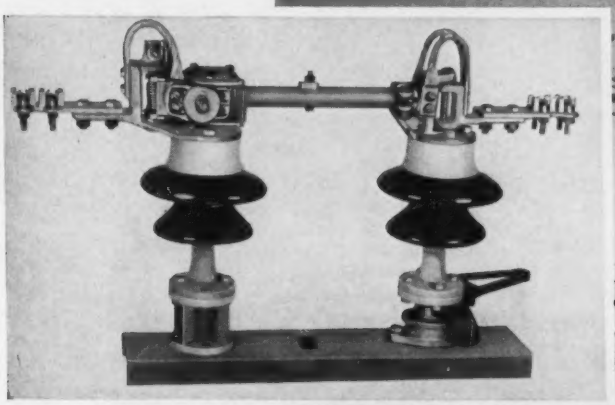
More expansion

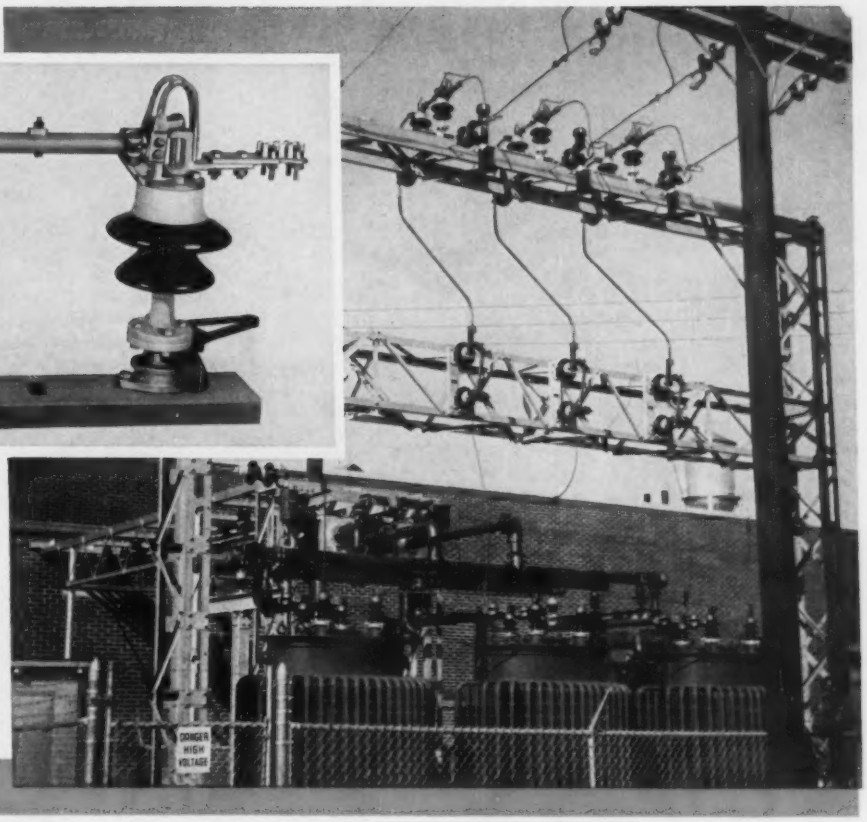
Jurisdictional fight over luminous ceiling installations seems to have been settled at the national level through a hearing before the jurisdictional council of AFL at which IBEW and the Carpenters' Union were heard. O. A. Rieman, IBEW, and J. F. Cambiano, Carpenters' Union representative, wired that the national committee had tentatively agreed on a division of work substantially equivalent to that agreed upon by the joint committee in San Francisco on Jan. 9. Electrical Contractors Robert Schwartz of Oakland and Fred Wider of San Francisco were asked to testify at the hearing.

Draw the line

Division of work is about as follows: All fluorescent strips, wiring and hangers to support the luminous elements of the ceiling are to be installed by electricians. Acoustical material and hangers for it are to be hung by carpenters. Where a common T-bar is used for both luminous elements and acoustical support a local agreement is to be reached.

Whose is which





Southern States' Type 57-K Group Operated Air Break Switches are used in this modern Shelbyville, Tennessee, plant. Self-adjusting line contacts maintain high-pressure permanently. Non-corrosive, greaseless bearings and a minimum of moving parts keep maintenance low. Available in voltage ratings from 7.5—69kv and continuous current ratings from 400—1200 amps. For details, ask for Bulletin 5457K.

U.S. RUBBER IS GOOD EXAMPLE OF HOW NATION'S INDUSTRIES USE SOUTHERN STATES EQUIPMENT

Increased use of power by the nation's expanding industries is calling for more substations and switchyards. Southern States is ideally equipped to handle these applications to the complete satisfaction of industries and suppliers of power alike.

A Shelbyville Power System industrial substation at the U. S. Rubber Co. Plant in Shelbyville, Tennessee, is a good example. Southern States supplied the substation and many components: the type 57-K Group Operated Air Break Switches for disconnecting incoming 15 kv lines; B Series Power Fuses to protect the transformers; connectors and bus fittings which accommodate conductors carrying up to 3500 amps; and heavy-duty, hookstick operated disconnects that provide a means for isolating the station from the plant.

Industries, as well as the nation's leading utilities, look to Southern States for top-quality, functional equipment. It will pay you to specify products made by Southern States.

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IN CANADA: Dominion Cutout Co., Ltd., Toronto

Blackout in paradise

Marooned in an all-electric motel, when the power lines to it were washed out in the floods, was the ironic experience of Harold L. Gerber, consulting electrical engineer, on his return from inspection of a hospital job near Eureka, just before Christmas. How some 60 people survived four days, cut off by washouts, he described to the Electric Club of San Mateo Jan. 10. Gerber impressed his audience on how dependent modern living is on electricity. He also suggested a market for auxiliary plants.

Going strong

Electrical Contractors Division of the Bureau of Home Appliances, San Diego, will again sponsor the exhibits in the West Building of Balboa Park during the annual Spring Fair of Modern Home Ideas April 24-29. Directed at the 180,000 who visit the show will be materials and equipment contractors install for the home . . . Annual bureau report shows that the contractors' division held three dinner meetings, total attendance 550; 11 executive committee meetings, attendance 75; and conducted two certified lighting courses for 60 persons; plus a 2,000 attendance at the electrical construction and maintenance show during the past year.

"Temporary" answer

Hill Electric of North Sacramento has developed an ingenious auxiliary electrical service entrance plug-in device that eliminates temporary service pole during construction. See story in our next issue.

Too many stars

Star Lighting Fixture Co., Los Angeles, subsidiary of Thomas Industries Inc., Louisville, Ky., was awarded a permanent injunction against Lights by Starlite Ltd., Los Angeles, enjoining it from using that term or the trade name Starlite in its catalog or advertising. It must use the designation "Chas. A. Starr Light Co." or similar designation. Star Lighting Fixture Co. was awarded exclusive use of its trade mark Starlite and illustrations of that kind. Thomas Industries Inc. also operates the Moe Light Division. The Star Lighting Fixture Co. is moving to the central manufacturing district of Los Angeles.

Round begins

Area meetings of NAED for the year 1956 start in Seattle Feb. 2, according to Bill Jewell, Pacific Zone managing director. Next meeting is scheduled for Los Angeles area late in March, San Francisco in April and an area meeting for the first time will be held in Phoenix soon. Annual convention is scheduled for the Westward Ho Hotel, Phoenix, Sept. 30 to Oct. 3, a week following the big San Francisco national NECA convention. This will permit eastern visitors to make both conventions in one 3-week trip.

Light for Canada

Canada will have a Canadian Lighting Bureau to correlate in that country the activities carried on by the National Lighting Bureau, American Home Lighting Institute and the Edison Electric Institute's Better Light—Better Sight Bureau in the U. S. It will promote better lighting and increase the Canadian market for lighting equipment. The Canadian Electrical Manufacturers Assn. helped organize the exploratory meeting. D. A. Wilson of Toronto was named chairman of the organization's committee.

Changes

Okonite company's promotion of John D. Fess, who has been Northwest manager, to Pittsburgh as of March 1 has brought a regrouping of personnel in that area, according to I. W. Borda, vice-president, San Francisco. James B. Caldwell Jr., who was in the Los Angeles office, becomes branch manager in Portland. He is a Stanford engineering graduate and was once with Allis-Chalmers in San Francisco. Edwin R. Conklin, resident representative in Seattle, will likewise open offices in that city to care for the State of Washington.

Display

Lightolier is establishing a West Coast sales office in Los Angeles at 802 Brack Shop Bldg. to house a display of its commercial and residential fixtures and lamps.

Annual headache

Wage negotiations opened again and the sparring began to get some value return for the high scales demanded by the union. Los Angeles Chapter, NECA, settlement for $3.45 per hour for journeymen without fringes in November and a jump to $3.60 per hour in July set the new pattern of demands, plus fringes, that will be reflected throughout the West. San Diego, which had settled on a two-year contract until April 30, 1957, for $3.25 per hour plus 10c health and welfare, now wants to reopen on new increased demands. Oakland is bound to get the biggest bounce because its scale was set lower than the Bay Area by a council decision. Only protection on work in progress is a warning that negotiations are about to begin.

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To be wished

Whether anything will come of the talk for a Bay Area-wide agreement on wage scale and fringes is a question. Equalization of travel expense and similar expensive troubles would also be a great benefit to the industry and the public.

Welcomed spokesman

Laurence W. Davis, popular once-managing director of National Electrical Contractors Assn., came out of retirement to address the East Bay Electric Club in Oakland Jan. 16. He is now a resident of that city. He spoke of the first affiliation of the California Electrical Contractors Assn. in 1909 and traced NECA history through the years. W. R. Grasle, vice-president, District 6, NECA, from Portland, was also honored. He described the NECA program and its benefits to the others in the industry. Ernest Kramm, Northern California Chapter manager, was chairman of the day. Grasle visited all California chapters on his trip.

More officers named

It was election time among NECA chapters last month. In brief, some of the results were: Sacramento Valley Electrical Contractors Assn., the NECA chapter, installed its new officers at an annual dinner-dance meeting Jan. 20. A. J. Naylor Jr. of George Foss Co. was installed as president, succeeding Rex Moore Jr. E. L. Bryant, Collins Electric Co., is vice-president; Paul Gatejen secretary; E. T. French treasurer; and Hugo Becker NECA governor . . . And San Francisco Electrical Contractors Assn., NECA chapter, re-elected its complete slate of officers for another term at the suggestion of Earl Peak, its governor. Emil J. Weber is president, Earl Peak vice-president and governor; L. Roy Moser treasurer; Edward W. Scott secretary . . . Northern California Chapter elected Harold Pierce of Ed Pierce Electric Co., Vallejo, as chapter president; Joe Barnes of V-G Electric, Richmond, vice-president; Ed Buttner as governor; W. A. Cyr as treasurer at its Jan. 11 board of directors meeting in Oakland . . . San Joaquin County Chapter at Stockton re-elected J. E. McCarty of Bright Spot Electric Co. as its president and R. Goold as governor . . . For the California-Nevada conference of NECA chapters, Al Berg of Los Angeles was elected to succeed Emil Weber, Weber of San Francisco becomes vice-chairman and Warren Penn, executive v-p of Los Angeles Chapter, becomes secretary, succeeding W. J. Varley of San Francisco.

Plans are cooking

Intermountain Region IES conference, late word from Salt Lake City advises, will be co-chairmanned by J. Homer Shaw, Utah Power & Light Co., and A. E. Fleming, General Electric Supply Co. Les Johnson, G-E Co., is program chairman. Meetings start April 26, Hotel Utah, in the morning and continue through Friday. A luncheon on Thursday and the banquet Friday evening are scheduled. Saturday will be reserved for field trips.

Had you heard?

News about people: Robert Maxwell, retired electrical inspector of San Jose, was made an honorary member of the IAEI and presented its certificate at the Northern California Chapter meeting Jan. 28, Oakland . . . Ira Williams, Eureka city electrical inspector, died in December . . . Ed Kanner, Western Insulated Wire Co., has recently been appointed sales manager . . . Kenward S. Oliphant, chief engineer for the Thomas B. Hunter Co., is carrying on the projects of the late Mr. Hunter, pending settlement of the estate . . . O. B. Lund of Havre, Mont., was appointed to the directorship of Refrigeration & Air Conditioning Contractors Assn. National . . . Floyd W. Miles, 69, who five times was president of Local 77, IBEW, Seattle, died Jan. 18 . . . Mel Cammisa, electrical engineer, formerly with Charles A. Langlais Co., has joined Edward Hill Jr. at 199 Geary St., San Francisco.

Time honor

Roy W. Kimberlin, district manager, Central Pacific District of Graybar, and a director of the company, made a watch presentation to 14 employees in San Francisco recently. The presentation is a program for all who have completed 25 years or more of service with the company as of Dec. 1, 1955.

Backfield in motion

General Electric Co. has made some top-level organizational shifts which are slowly being reflected in the field, although details are not yet apparent. General Electric Distributing Corp., a wholly owned subsidiary, was merged into the parent corporation and G-E Supply Co. becomes a division of it. Hotpoint appliance company becomes a department of G-E Supply, according to Business Week. G-E Appliance Co., however, is a department of the Appliance and Television Receiver Division. There seems to be some indication that the Supply Co. will have managers of apparatus and supply, consumer products and of operations, which may mean rearrangements too.

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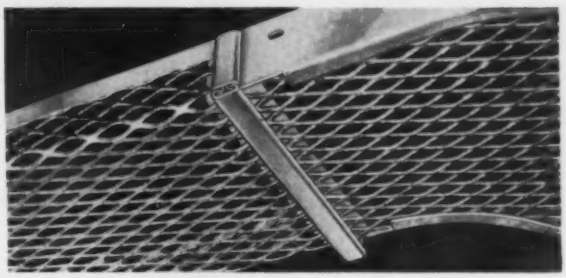

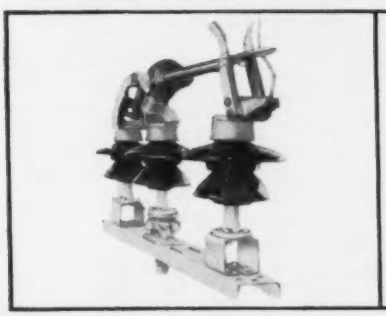

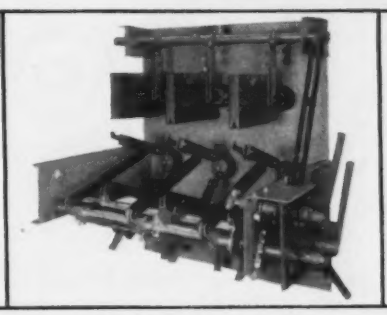

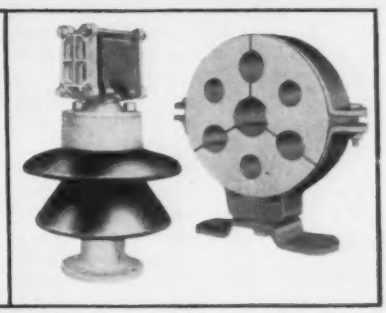

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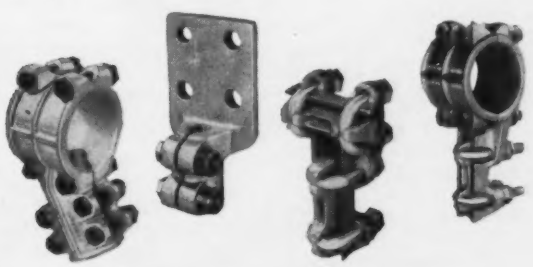

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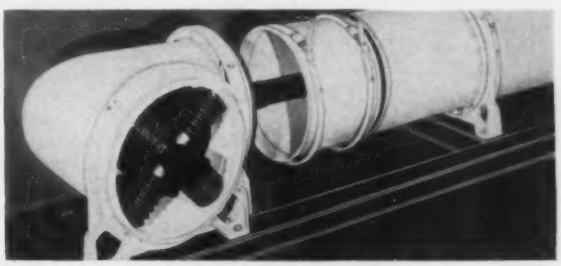

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Quick Catch-up

IEA

Intermountain Electrical Assn., headquartered in Salt Lake City, elected a wholesale distributor, Ernest D. Schettler, Modern Electric Supply Co., of that city as its president for 1956. Utah born and educated, he started with Westinghouse as shop man, worked for contractors, then opened his own business as Modern Electric in 1933, converted it to a wholesale supply business in 1935.

Special ceremony at the Jan. 17 installation meeting was presentation of certificates of appreciation to retiring officers and making of life-time membership awards to Sam W. Leaver, W. E. Fleetwood, L. John Christensen, E. F. Schettler, Dr. H. T. Plumb and Ed. H. Eardley. Jacob A. Kahn, first president, recounted how the league was organized. Date for the annual conference was set for March 16.

Other officers elected and installed included: Bennett Larsen, KDYL-KTTV, vice-president; Amos Bronson, G-E Supply, secretary-treasurer; Directors: Retailers, Dick Bennett and Lewis A. Dahl; Contractors, Floyd Shipp, NECA, R. E. Bartlet and Jim Hamilton; Wholesalers, Kenneth Taylor, Del Kuhre, and R. S. Belnap; Manufacturers, D. R. Dyrenforth, G-E, John Longdon, NEPCO, and Leo Hansen, Westinghouse; Utilities, DeLamar Holt, UP&L, Ora Barlow, Mt. States Telephone, and George Larsen, Provo Utilities. Robert Trottier is managing director.

Chapter officers elected include Ken Porter, Cache Valley; Darrell Iverson, Ogden; H. D. Muir, Salt Lake retail; Sheldon Anderson, southeastern Utah; Orland Mason, Sevier County; Arnold Angel, Utah County. Representing radio and TV are L. H. Curtis, KOVO; Tom Anderson, KALL; Lenox Murdock, KSL. Immediate past president is P. A. Maughan, Capitol Electric Co., a contractor.

IEEL

Inland Empire Electrical League re-elected its president Joseph J. Thomas of Densow's, a dealer, for a second term at its December board meeting. John M. Stork, Westinghouse, was named vice-president; V. E. McCain, Graybar, was re-elected treasurer and Frank Tool, Washington Water Power Co., secretary-treasurer and manager. Directors include Warren Myer, Densow & Myer;

Schettler

Henry Smith, Smith Electric; Lester Grimes, Grimes Appliance, Clarkston; Vern Barney, Barney's City Electric, Colville; Spencer Lewis, Spence Electric, Moscow; George Tabor, Wallace; Lester McCracken, WESCO; Harold Stack, Stack Electric; Raleigh Spiger, Sunset Electric; Dave Cohn, Prudential Distributors; and Kimball Jack, WWP. Section chairmanships were given to: Austin Lovell, Graybar, appliance; Lester Stewart, Maxwell's, supply and apparatus; and Birney Blair, KHQ-TV, radio and television.

NWEL&PA

Personnel and Safety Section of Northwest Electric Light & Power Assn. has completed its plans for its spring conference in Seattle at the same time that the Business Development Section meets. Indeed one session and luncheon of the two will be held jointly. Russell B. James, Portland General Electric Co., has announced speakers for these. Dewitt Pike, superintendent, employee relations department, Rochester Gas & Electric Co., will address the joint opening session. His subject: "Making Communications Pay Off." Gordon DeCoss, supervisor, testing section, Oregon State Employment Service, will speak on "Aptitude Minimums for Apprentice Linemen." The luncheon speaker will be L. L. German, manager of employee and public relations, Hanford Atomic Products Operation of General Electric Co. His subject is, "The Middleman in Management."

The last day of the conference will open with an address on "Utility Organization" by Howard Arnett, executive assistant to the board chairman, Portland General Electric Co. The Safety group will contribute speakers on electric shock treatment and third party accidents.

Electric Clubs

Austin M. Case, employee of Graybar Electric Co., 35 years in Seattle, Tacoma and Portland, has been installed as president of the Electric Club of Oregon. He succeeds Harry F. Stengel of Bonneville Power Administration. Other officers will be L. J. Collins, Portland General Electric, first vice-president; Stan Martz, General Electric Co., second vice president; George Bocarde, Pacific Power & Light Co., treasurer; Joseph Liebrich, PP&L, sergeant at arms; Leonard Kallen, executive secretary.

EMEA Show Shapes Up

Already 75 companies have received space for the Electrical Industry Show of the Electrical Maintenance Engineers Association of Southern California, says Charles Hays, general chairman. The eighth biennial show will be in the Shrine Exposition Hall, Los Angeles, April 5-7.

To address the kick-off luncheon in the Golden State Room, Hotel Statler, at noon, April 5, will be Edmund McKanna, formerly on the Los Angeles planning commission and past manager of the county Jay Cee.

The show, promising to be larger than in any previous year, is restricted to invitations to maintenance engineers, consulting engineers, contractors, purchasing and design personnel of government agencies, architects, industrial management people and others interested in specification of materials. Educational exhibits from colleges and universities will also be included.

IES

Theme of the Illuminating Engineering Society Pacific Northwest Conference at Spokane's Davenport Hotel, April 19-21, will fit with the golden anniversary of the society with special emphasis on the anniversary at the banquet April 19. R. F. Hartenstein, president of the society, and C. L. Crouch, technical director, will represent the headquarters and give messages fitting to the occasion.

Willard C. Brown, manager of application engineering, large lamp department, General Electric Co., Nela Park, will be one of the featured speakers. His subject will be "European Development and Light Sources." Returned recently from a trip to Europe, he will

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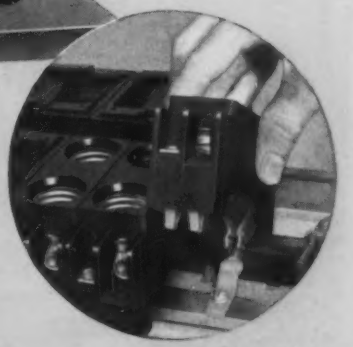
Square D offers you two new basic devices, one with space for 28 circuits—the other, 40. Both devices have a 200 ampere main pullout.

Boxes, interiors and fronts, as well as packaged plug-in units (plug fuse or pullout types) are available off-the-shelf from your Square D distributor—right now!



All plug-in units feature Square D's exclusive *SWINGRIP* mounting—easy, speedy installation, automatic alignment and positive contact with bus bars.

Write for Bulletin SD-36. Square D Company,
4335 Valley Blvd., Los Angeles 32, Calif.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

Quality-Control

SERV-ENS

assure tight, neat service entrance connections

Between the two bores of each Serv-Ens sleeve is a solid metal barrier. Each conductor fits into its own socket. The metal "spacer" prevents galvanic action between dissimilar conductors . . . eliminates strand wicking of water between them.

These sleeves make it easy for your crews to make perfect connections every time . . . without wasting time. Serv-Ens are perfect for splicing all combinations of ACSR, aluminum and copper conductors for service entrances. To save time, each sleeve is plainly marked with conductor cut-off length and size range. The bores contain KEARNALENE, a corrosion inhibitor. Ends are sealed with plastic caps . . . color-coded for quick size identification.

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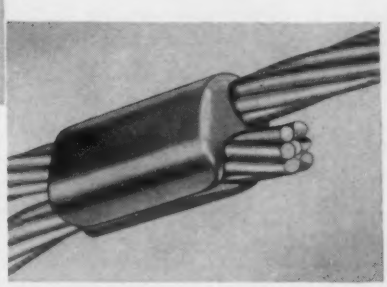
4224-42 CLAYTON AVE., ST. LOUIS 10, MO.
Canadian Plant: GUELPH, ONTARIO

Your Construction with KEARNEY COMPRESSION CONNECTORS

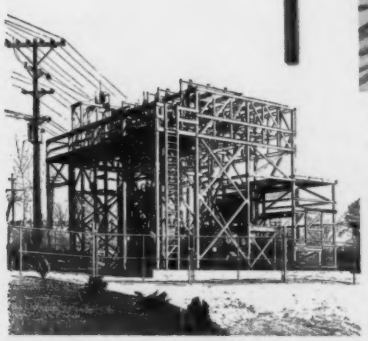
TERMINAL CONNECTION ADAPTER

This special-purpose Serv-En eliminates problems in connecting aluminum conductors to the bronze or copper terminals of transformers, cutouts, capacitors, etc. The aluminum sleeve is *factory bonded* to a length of soft-drawn copper wire and the joint is sealed with highly weather-resistant plastic.



SQUEEZON . . . *the original compression connector* . . . for dozens of time-saving, trouble-saving applications . . . features KEARNEY's exclusive "built-in spacer" design that grips each conductor around its full circumference . . . conductors never touch, prevents strand-cutting and galvanic action.

SPLICING SLEEVES . . . for fast line splices that are electrically and mechanically superior to any other method.



Sleeves Field Tested . . .

Here at KEARNEY's 445,000 KVA Substation Laboratory all equipment is tested under rigorous field conditions. KEARNEY Certified Ratings are actual, proved performance ratings . . . not just theoretical calculations. You can be sure they will do the job they are supposed to do . . . with a generous margin of safety!

318

For BETTER CONSTRUCTION SAFER MAINTENANCE *Specify* JAMES N. KEARNEY *The Mark of Quality* **KEARNEY PRODUCTS**

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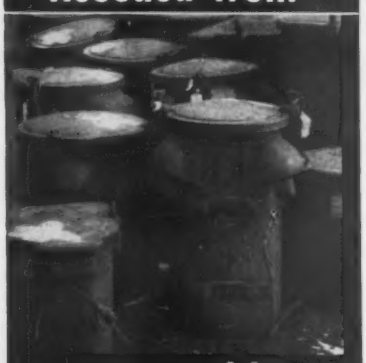
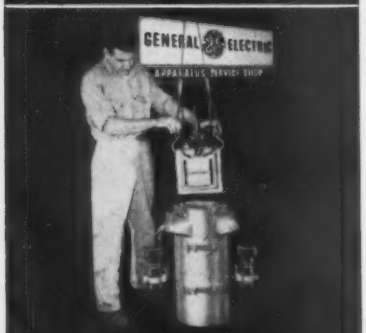


graveyard by



G-E Service Shop

Get your obsolete distribution transformers back on the pole again—as good as new! Just call your local G-E Service Shop. We'll rebuild them ...uprate them 40% or more ...and return them with new-transformer warranties. There are 31 G-E Service Shops throughout the country—one near you. 431-31

Progress Is Our Most Important Product

GENERAL ELECTRIC

1956 Assocation Meetings Scheduled

February

6-10—**Winter Market**, Western Merchandise Mart, San Francisco

29—**San Diego Bureau of Home Appliances**, winter conference, Balboa Park

March

16—**Intermountain Electrical Assn.**, annual conference, Salt Lake City

22-23—**Pacific Coast Electrical Assn., Engineering and Operating Section**, Sheraton-Palace, San Francisco

April

5-7—**Electrical Maintenance Engineers of So. Calif., Industrial Show**, Shrine Auditorium, Los Angeles

11-13—**Northwest Electric Light & Power Assn., Engineering and Operating Section**, Hotel Vancouver, Vancouver, B. C.

11-13—**Institute of Radio Engineers**, regional conference, Hotel Utah, Salt Lake City

11-13—**Illuminating Engineering Society**, South Pacific Coast Region conference, Hotel Mark Hopkins, San Francisco

17-18—**PCEA, Administrative Services Section**, Sheraton-Huntington, Pasadena

19-21—**IES**, Pacific Northwest Region conference, Davenport Hotel, Spokane

24-29—**San Diego Bureau of Home Appliances**, spring fair, Balboa Park

26-28—**IES**, Intermountain Region conference, Hotel Utah, Salt Lake City

29-May 1—**Rocky Mountain Electrical League**, spring conference, Shirley-Savoy Hotel, Denver

May

3-5—**National Electrical Contractors Assn.**, District 6 & 8 conference, Hotel Utah, Salt Lake City

10-12—**Northwest Public Power Assn.**, Engineering & Operating Section, Wenatchee.

14-16—**PCEA**, annual convention, Las Vegas

21-23—**NWEL&PA, Business Development Section**, Benjamin Franklin Hotel, Seattle

June

21-23—**NWEL&PA, Accounting & Business Practice Section**, Portland

25-29—**American Institute of Electrical Engineers**, summer and Pacific general meeting, San Francisco

September

10-12—**International Association of Electrical Inspectors, Northwestern Section**, Salt Lake City

17-19—**IAEI, Southwestern Section.**

24-28—**NECA**, national convention, San Francisco.

October

1-3—**National Association of Electrical Distributors**, Pacific Zone annual convention, Westward Ho Hotel, Phoenix

7-10—**RMEL**, annual convention, Broadmoor Hotel, Colorado Springs

November

23-28—**San Diego Bureau of Home Appliances**, annual appliance show, Balboa Park

cover the fluorescent, filament and mercury applications and developments that he found in Europe.

Plans for the conference are developing. Other speakers have not been fully scheduled. Their sessions will take place on April 19 and 20, and possibly on Saturday morning, the 21st. Dave Mozes is in charge of the papers to be presented from the section. Blair E. Plowman, Washington Water Power Co., is regional vice-president and the Inland Empire Chapter of Spokane will be host.

Intermountain conference will be staged at the Hotel Utah, Salt Lake City, April 26-28. So far no information is available as to the plans or arrangements.

South Pacific regional conference will span San Francisco Bay in its program. Although the Mark Hopkins is headquarters and most of the sessions will be held there, after the opening session Wednesday afternoon on outdoor, street and floodlighting, a dinner will be held at Spenger's in Berkeley followed by a visit to the University of California's street lighting laboratory near Richmond, followed by a tour of floodlighting, bridge and street lighting installations in the East Bay.

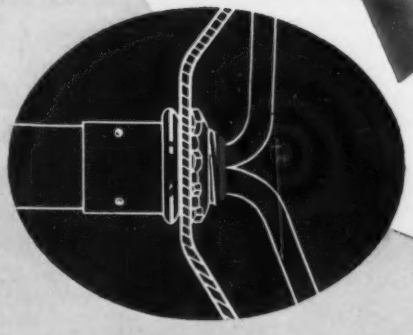
The program, being arranged by John Walsh, will hold separate sessions on Thursday morning on residential lighting, Thursday afternoon industrial lighting and Friday morning store and commercial lighting. The banquet honoring President Hartenstein and commemorating the 50th anniversary of IES will be held Thursday night. A president's luncheon for the president's report on IES activities will conclude the session Friday afternoon.

National speakers on the program in addition to President Hartenstein and C. L. Crouch, IES technical director, will include L. M. Cutler of General Electric Lamp Division engineering, Nela Park, and Richard G. Slauer, Sylvania Electric Products, Salem, Mass.

Red Throat

B-M 21B, THE NEW INSULATED THROAT INDENTER CONNECTOR FOR E.M.T.

Four Ways Finer



1. Protruding rounded red plastic lip of bushing prevents cutting of insulation—eliminates shorts.
2. Full thread screws into all conduit fittings. Lip of RED THROAT bushing protects thread from damage.
3. Deep dished eight pronged lock nut is easier to drive on—screws flush to shoulder and digs into metal of box for vibration proof positive ground.
4. Permanent locked-in bushing insures smooth burr-free raceway for easy fishing. No extra work and costs no more.

Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job!

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Power company saws through lays *Tiger Brand* Submarine

In she goes. Cable was orginally pulled across the lake with a jeep. The steel armor on cable took up the pulling strain.

Crew of men jockey the cable into position before cutting trench. Mr. Finch says, "We were amazed at the flexibility of the cable."

This is one of the two ice saws used for cutting the trench. It is gasoline powered, mounted on skids.

11 inches of hard ice . . . Cable without boats or barges

• The scene is Upper Saranac Lake, N. Y. Paul Smith's Electric Light & Power and Railroad Company wanted to lay a 2000-foot continuous length of Tiger Brand Submarine Cable under water. Ordinarily this would require expensive boats, barges and crews.

But Raleigh Finch, General Superintendent, decided to wait for a big freeze, saw a slot in the ice, then drop the cable to the bottom. The cable was so flexible, that it only took 15 minutes to unroll the entire 2000 feet onto the ice. The picture captions explain how the job was done.

The cable involved is 2-conductor, 5000V, #4 AWG, steel armored, rubber insulated, non-leaded. It was selected because of its flexibility, light weight and low cost. The cable joins a previous Tiger Brand Submarine Cable that was laid in 1932. According to Mr. Finch, "We haven't had a service failure in that cable since it was laid 24 years ago. In fact, we've never had a piece of Tiger Brand fail, in the 30 years that we've been using it."

Any user of electrical cable can have this same kind of reliable performance. Just switch to Tiger Brand.

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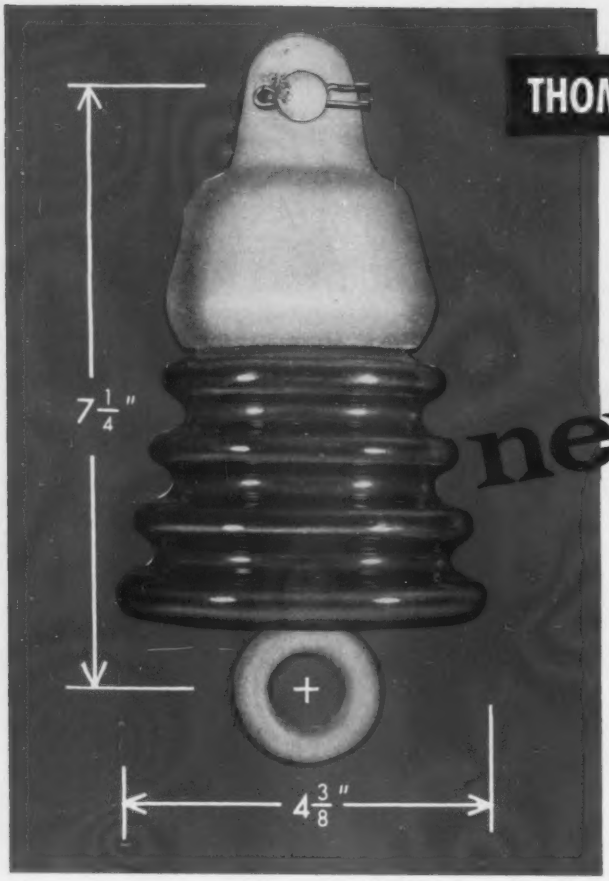

THOMAS *Best by line test*

new design

1 for 2

RUGGED-TYPE GROOVED STRAIN INSULATOR

This single unit does the work of *two* 6″ or one 10″ conventional disc-type unit and is used for dead-ending voltages up to and including 12 Kv. Its superior mechanical and electrical characteristics effect a very substantial reduction in dead-ending cost. Note the smooth lines formed by the outer edges of the corrugations and forged steel cap—no porcelain projections to receive the brunt of rough handling. If dropped, impact is distributed uniformly over porcelain and cap . . . reduces danger of breaking.

Thousands of units are giving satisfactory performance. Reports indicate that the new Thomas design is superior to any previous dead-ending unit.

Specify Thomas Catalog No. 1315 Rugged-Type Grooved Strain Insulators with full confidence that their quality and value cannot be surpassed.

Packed 12 per carton in Thomas "PACKT-TO-STACK" modern cartons. Write for prices and sample today.

Engineering Characteristics

Flashover—Dry-65 Kv., Wet-35 Kv., M & E Strength—10,000 Lbs., Leakage Distance—7½ Inches.

The R. Thomas and Sons Co.

1873 THOMAS INSULATORS our 82nd year RELIABILITY 1955

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THIS MONTH'S NEWS

Criminal Charge Asked Against IP Co. Officers

The Oregon Hydroelectric Commission has been asked to file criminal proceedings against officers of Idaho Power Co. for starting construction of Brownlee Dam without obtaining an Oregon license.

The request was made by C. Girard Davidson, counsel for the National Hells Canyon Assn., former Interior Department undersecretary, at commission hearings held in Baker, Ore.

Commission Chairman George W. Joseph opened the hearings at the request of the federal dam proponents because "there is a question whether the federal government or the states have jurisdiction."

R. P. Parry, attorney for Idaho Power Co., said the company considered it had full authority to proceed with construction after receiving the federal license.

The Oregon state law allegedly violated calls for fines up to $1,000 and jail terms up to six months.

Co-op Negotiates Sale After Membership Vote

Officers of Sandy (Ore.) Electric Cooperative have been directed by a majority of members to open negotiations for sale of its property and service to a utility.

At a recent meeting of the co-op, with 653 of its 877 members represented, the vote to open negotiations was 449 in favor and 204 against. If a deal for sale materializes, it will require approval of 587 members.

AT PRESS TIME Portland General Electric Co. had made a conditional offer to buy the co-op. Conditions include employment of all the personnel, full integration of system and lowered rates.

The co-op, organized in the early 1940s, has been and continues to operate at a loss, though rates for electric service based on 1954 kwh sold was 3.04c per kwh. Engineers have advised the co-op that it would take a 3% hike to break even and a 10% raise to enable the group to catch up on debt payments over a 15-year period, a total increase of 13%.

Pictured is Folsom Dam at the height of the destructive December floods on the West Coast

Great Flood Destruction Halted by Power Dams

Utilities from California's Central Valley and northwest along the Pacific Coast to western Oregon and western Nevada are busy with the expensive chore of cleaning up after severe December floods.

Extensive as the damage was though, to communities and farmlands as well as utilities, impressive amounts of potential flood waters were held back by private and federal dams.

Pacific Gas and Electric Co. reports that its 57 reservoirs captured 470,000 acre-ft of flood water.

Another 670,000 acre-ft were trapped by dams of irrigation districts, City and County of San Francisco and Southern California Edison Co.

Bureau of Reclamation and Corps of Engineers reports state that federal dams held back about 1,421,300 acre-ft at Shasta and Millerton lakes, 890,000 acre-ft at Folsom Dam, and more than 400,000 at Pine Flat.

Much of this information is carried in a letter from Robert H. Gerdes, executive vice-president of Pacific Gas and Electric Co., to Congressman Clair Engle, chairman of the House committee on interior and insular affairs. The House committee conducted a survey of flood damage.

Gerdes reported the PG and E had more than 300,000 kw of generating capacity temporarily out of service because of the floods, but that this is less than 7% of total capacity and about half of the reserve capacity.

He said in the letter: "Floods like those which recently have ravaged California can and must be controlled by the combined efforts of federal, state and local agencies. We again pledge our cooperation to this end."

Portland District, Corps of Engineers, reports about $13,000,000 worth of damage from flood waters in the Willamette Basin. It was estimated that $9,000,000 worth of damage was prevented by control reservoirs of the area.

Major damage in Oregon was caused by coastal rivers that do not have control structures. These are the Umpqua, Rogue, Coquille and Klamath rivers. No estimate of damage was made.

• **Arizona Power Authority** has contracted to purchase 30,000 kw of power from Arizona Public Service Co. The contract is subject to cancellation by the authority after 10 years.

• **Research,** design and construction are currently under way at the University of California's Los Alamos, N. M., scientific laboratory that may lead to the design of a nuclear reactor capable of supplying Los Alamos with power.

PEERLESS
brings you
LIVING LIGHTING

Now it can be told! Berkeley Square was introduced by PEERLESS months ago. Since then, it has excited architects and engineers everywhere. No other enclosed on-ceiling incandescent fixture enjoys the popularity and endorsement of Berkeley Square—proved by actual sales! What's more, despite the incomparable design and quality, the cost is surprisingly low.

ideal for new and existing interiors

The instant you take a Berkeley Square unit from its safety-plus shipping carton, you realize how special a fixture it is! This shallow unit is truly the all-purpose fixture for corridors, stores, public rest-rooms, kitchens, bathrooms, and outdoors. And it can be mounted on any ceiling in seconds.

TWO SIZES FOR EVERY APPLICATION

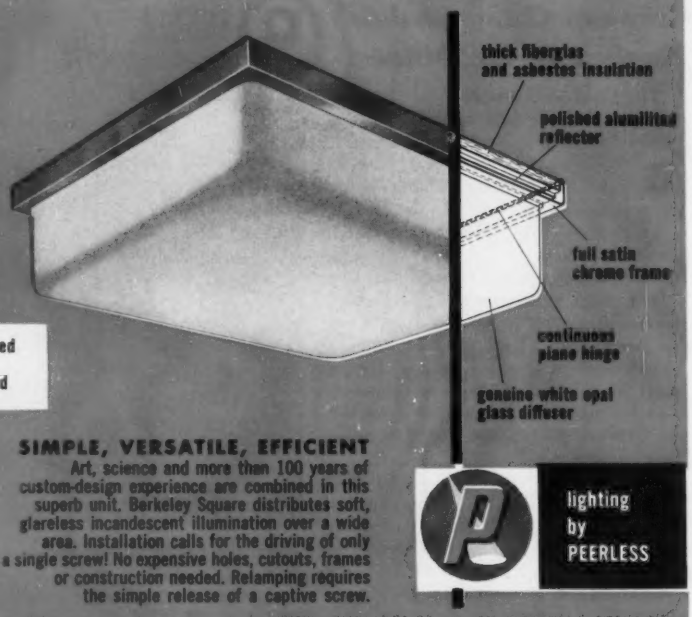
Select and specify Berkeley Square from 2 sizes:
10" square with two 75 watt lamps.
12" square with one each, 100 & 75 watt lamps.

SEND FOR DETAILS AND CATALOGS OF PEERLESS COMMERCIAL, RESIDENTIAL, CHURCH AND MARINE LUMINAIRES, FLUORESCENT AND INCANDESCENT.

PEERLESS
ELECTRIC COMPANY
576 FOLSOM ST., SAN FRANCISCO

BERKELEY SQUARE

A SHALLOW, SURFACE-MOUNTED INCANDESCENT DIFFUSER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SIMPLE, VERSATILE, EFFICIENT
Art, science and more than 100 years of custom-design experience are combined in this superb unit. Berkeley Square distributes soft, glareless incandescent illumination over a wide area. Installation calls for the driving of only a single screw! No expensive holes, cutouts, frames or construction needed. Relamping requires the simple release of a captive screw.

lighting by PEERLESS

Early Navigation Law Threatens Cowlitz Job

Plans of Tacoma City Light to build Mayfield and Mossyrock Dams on the Cowlitz River were dealt a severe blow recently by the existence of a 1909 law barring municipal power installations from navigable streams.

Tacoma officials, at a court hearing on litigation brought by Washington game and fish departments were given an oral decision by Superior Court Judge Charles T. Wright that the project would violate a state navigation law.

The ruling stops further construction but City Light officials have asked for a stay of order until the case can be argued before the State Supreme Court.

About 100 engineers and 170 construction workers are already building a cofferdam at the Mayfield site, and approximately $15,000,000 worth of equipment is on order for the project, according to Dean Barline, utilities director.

Apparently the navigation law applies to municipalities, because Barline confirmed that private power companies have indicated interest in purchasing the sites.

Nuclear Powered Plant In Plans for Edison Co.

Southern California Edison Co. will participate in atomic energy research for power generation by building a 7,500-kw generating plant to operate from steam produced by a sodium graphite reactor and heat exchanger.

The $1,000,000 plant will be constructed to take steam from an experimental reactor being built by Atomics International division of North American Aviation Corp. at Santa Susana Mountain in southern California. The reactor is being constructed under a contract with the Atomic Energy Commission. It uses liquid sodium to carry heat out of the core to a heat exchanger.

Arizona Public Service To Buy Univac Machine

Approval for the purchase of a Univac electronic data processing system by Arizona Public Service Co. has been given by the board of directors.

In the company 1956 budget is an appropriation of $1,522,000 for the purchase from Remington Rand division of Sperry Rand Corp.

Manufacture and installation will be completed late next summer or early fall, but full operation will not be possible until late in 1957. The company reports that establishing procedures will require much intensive work to get the most effective use of the system.

Company personnel, outside consultants and a scientific research organization have spent the past 16 months studying various systems for application to the company's operations.

Eel Development Plan Gets Bechtel Approval

A State of California plan for Feather River developments to cost about $1,500,000,000 over a period of 30 years has received a favorable report from Bechtel Corp.

Bechtel, which conducted a $250,000 study for the state, also recommended state ownership and operation. Building time would be 30 years and financing would be with general obligation bonds.

• **San Francisco Attorney** David K. Watkins has lost his legal fight to have the Central Valley Project transferred from the federal government to the State of California.

It Took Only About 10 Minutes to Pull a Simplex-Anhydrex 5KV Cable Through Six Floors of Conduit

When transformers became too heavily overloaded in a Boston office building recently, it became necessary to install a circuit breaker, a unit substation, and a 5kv cable.

The cable, Simplex Anhydrex XX-insulated, shielded, and neoprene-jacketed, was pulled in from the seventh floor unit substation to the circuit breaker on the ground floor.

Negotiating four right-angle turns and approximately 230 feet of steel and fiber conduit, the cable reached the circuit breaker room in about ten minutes.

The cable came through the conduit so fast, the crew at the lower end were hard-pressed to keep the pulling rope from jamming.

Simplex Lubricant No. 3 helped make this fast pulling job possible.

Simplex Rubber Insulations

ANHYDREX XX for power cables (3kv to 25kv and over) — resists heat, oxidation and ozone — has low water absorption.

ANHYDREX for power cables (0 to 2kv), and control, communication and signal cables — resists heat and oxidation — has low water absorption.

Write the address below for more details about ANHYDREX.

Simplex

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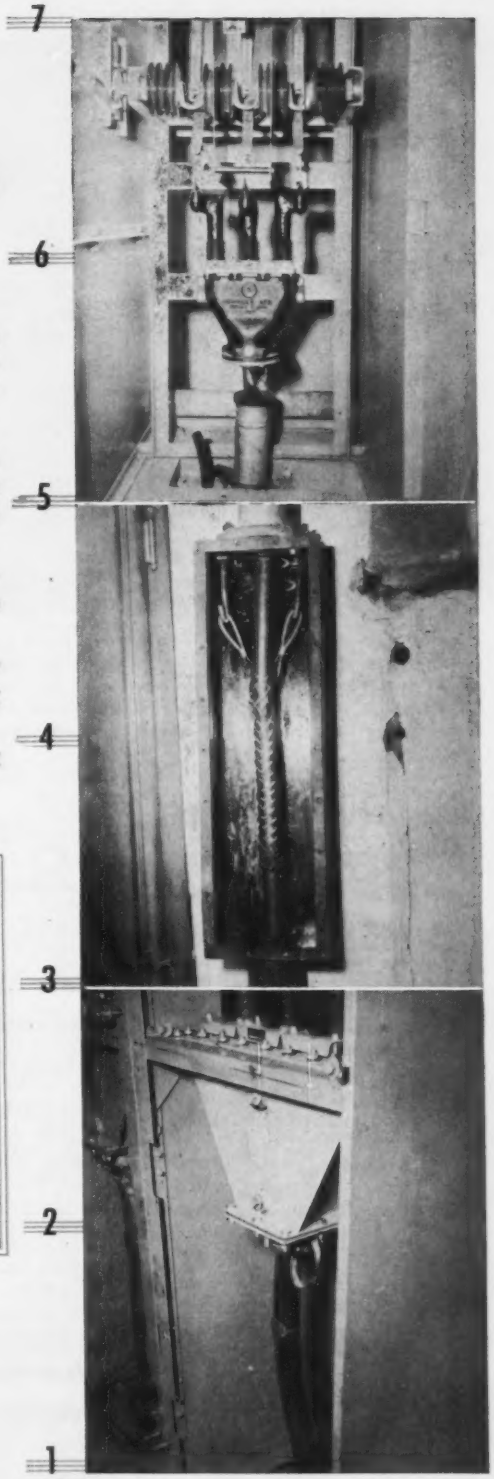
79 SIDNEY STREET, CAMBRIDGE 39, MASSACHUSETTS



Top Photo: Pothead of 500 kva dry-type transformer on seventh floor. Secondary feeds 110/220 volts to four floors above.

Middle Photo: Wire mesh grip on sixth floor holds weight of cable. Feeder runs through four-inch steel conduit from first to seventh floors.

Bottom Photo: Feeder connection at air circuit breaker on first floor. Cable transmits 4160 volts.

Saguaro steam plant of Arizona Public Service Co. was dedicated recently. Thousands of people visited the station, located in the desert in southern Pinal County. Guests included more than 100 civic, governmental and business leaders of the state. The 200,000-kw station was dedicated "to provide dependable electric service to Arizona homes, farms, industry, and business." Dedication ceremonies were held Jan. 19

Flathead Diversion Dam Investigated by Bureau

The Bureau of Reclamation is investigating construction of a diversion dam on the middle fork of the Flathead River and a seven-mile tunnel to carry water to Hungry Horse reservoir on the south fork.

It is estimated that the project would increase electric output of Hungry Horse about one-third, plus adding a 15,000-kw station at the tunnel outlet at Devil's Corkscrew Creek which flows into Hungry Horse reservoir.

Purpose of the project is to utilize middle fork spring runoff water that usually floods at the same time that storage at Kerr Dam, Cabinet Gorge and Grand Coulee is overflowing.

Fraser River Planning Getting Canadian Okay

Proposed construction of a 2,700,000-kw hydroelectric project on Canada's Fraser River by Moran Power Development Co. seems to have provincial cabinet backing.

Highways Minister Philip Gaglardi said in Victoria he was "confident the Moran Dam will be built on the Fraser River.

"At no time would we allow the fishing industry to be jeopardized, but I am confident the scientists will be able to get around this fish business," he said.

Fisheries authorities are protesting construction of a 720-ft-high dam north of Lillooet.

New Line to Serve Federal Customers

Southern Nevada Power Co. is building a 69-kv transmission line from near Las Vegas to the Nevada test site of the Atomic Energy Commission, Camp Desert Rock and Indian Springs air base.

The company has a $548,000 contract with AEC and the air force to supply electricity.

The contract permits the company to use 20% of the line's capacity for its own customers along the way.

Brownlee Work Goes On Despite Rainy Weather

Construction of Idaho Power Co.'s Brownlee project on the Snake River is moving rapidly ahead with Morrison-Knudsen Co. working a 24-hour, three-shift schedule.

Currently underway is drilling of a 2,540-ft diversion tunnel to change the course of the river.

Certified Lighting for a Better America

ELECTRICAL CONTRACTORS, WHOLESALERS, LIGHT & POWER COMPANIES!

This program is sponsored by all these member companies of the Industrial and Commercial Lighting Equipment Section of the National Electrical Manufacturers Association to help you increase your sales.

These manufacturers stand ready collectively and individually to cooperate with you in every possible way to help you get the most out of this CERTIFIED LIGHTING PROGRAM. Call on them!

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General Lighting Products Co.
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Holdenline Co.
Holophane Co., Inc.
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Two electrical "power houses on wheels," the largest mobile units ever designed for highway transportation in Canada, have been purchased by British Columbia Power Corp. The 500-kw units have been put into service at a cost of about $100,000 each. They will supplement power production from any of the 19 diesel stations operated by the commission

Puget Sound and Chelan Sign Partnership Pacts

Puget Sound Power & Light Co. and Chelan County PUD have signed two contracts that bring about partnership development of the Rocky Beach hydroelectric project and the sale of Puget Sound's interest in Rock Island Dam to the PUD.

An announcement made jointly by Frank McLaughlin, Puget president, and L. J. Richardson, president of Chelan PUD, discloses that the PUD will pay $28,276,200 for Puget's interest in Rock Island Dam. The same contract makes Rock Island power available to the private utility for 48 years.

Under both contracts all of the output of both projects, with the exception of 40,000 kw, will go initially to Puget, subject to a reservation for the needs of the PUD up to one-half of the output of both projects. The 40,000 kw excepted is for Douglas PUD.

Puget Sound will pay all costs except an amount to be paid by the PUD in proportion to the amount of power it uses.

The arrangement provides integration of Columbia River hydroelectric facilities east of the Cascade Mountains with hydroelectric and steam-electric facilities west of the mountains.

Interstate Compact To Make Appearance Soon

The Columbia Interstate Compact, tabled last year by Oregon, Washington and Montana legislatures, will be presented again in 1957 by the Columbia Interstate Compact Commission.

Aim of the compact is fair distribution, allocation and apportionment of the Columbia River and tributary waters among states in the watershed. They are Oregon, Washington, Idaho, Montana, Wyoming, Utah and Nevada.

Idaho, Utah and Nevada legislatures approved the compact last year.

Commission members have spent the past year explaining the compact to legislators and various civic groups, and two members recently held talks in Washington, D. C., with federal agencies involved.

The compact as it will be presented this year has only minor revisions.

Last-Stage Building Starts on BCE 345 Kv

Crews are clearing right-of-way for the last 37-mile link of Canada's first 345-kv transmission line, which gives a second circuit from Vancouver and lower mainland of British Columbia to a 186,000-kw plant at Bridge River.

Six steel core aluminum conductors will carry the power. Over-all cost of the 37-mile link will be about $113,500 per mile, or approximately $4,200,000 total. Cost of the entire project will be about $15,000,000.

It is a project of British Columbia Electric Co.

• **Hugh B. Mitchell,** former U. S. senator and representative and now a Seattle businessman, is proposing the formation of an International Columbia Power Commission to develop the Columbia River system. He blamed U. S. Commissioner Jordon and Canadian Commissioner McNaughton for "increased international misunderstanding."

New Buildings for USAF Air University...

WIRE BY PHELPS DODGE

Shown above are two of the four buildings recently finished for the Air Command and Staff School—largest school for the advanced education of Air Force officers—of the United States Air Force's Air University, Maxwell Air Force Base, Montgomery, Ala.

Reliable, long-life Phelps Dodge wire and cable, including Habirduct-Habirprene and Habirite-Habirprene, were specified and installed throughout all four buildings, which form the academic center of the famous Air Command and Staff School, to assure complete wiring satisfaction and trouble-free service.

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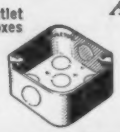

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Bids and Contracts

• **Brandon** Co., Vancouver, Wash., was apparent low bidder to build additions to LaGrande and Roundup substations of Bonneville Power Administration. Bid for LaGrande was $30,786; for Roundup $23,005. This work will complete the 230-kv intertie with Idaho Power Co. and eastern utilities of the Northwest power pool. Idaho Power has told Bonneville the Baker-LaGrande interconnection will probably be completed in May.

• **American Elin** Corp., New York, representing Austrian manufacturers, and **Legnano Electric** Corp., New York, representing an Italian firm, are apparent low bidders to supply nine 50,000-kva transformers to Bonneville Power Administration for the Columbia River power system. The Austrians bid $1,107.789 to supply seven; the Italians $382,000 to supply two. Lowest American company bid was twice as much.

• **Bechtel** Corp. has been awarded a contract to build the Poe project diversion dam and do related work for Pacific Gas and Electric Co. Amount of the contract was not announced.

• **Sather Electric Distributors** of Tacoma has received a City Light contract for $35,538 to supply rubber-insulated cable. **Graybar Electric** Co. received a contract to supply thermoplastic cable for $8,295.

• **Kelman Electric & Mfg.** Co., Los Angeles, is apparent low bidder to supply power circuit breakers to Bonneville Power Administration. Offer was $368,518, excepting one item, which will be delivered by **General Electric** Co. On bid invitation 7857, **Westinghouse Electric** Corp. was low with a bid of $69,910.

• **Columbia Geneva Steel** Co. of Portland has been awarded the first supply contract for Ice Harbor Dam. Contract is for 2,100 tons of steel piling for $331,000, which is to be used in the first-stage cofferdam. It is a project of the Corps of Engineers.

• **John M. King** Co., Tacoma, was low bidder for construction of switchyard additions, relay houses, cable tunnels, oil house and transfer track at Bonneville Power Administration's Big Eddy substation. Bid was $416,600.

• **Washington State** Power Commission has delayed making its bid to AEC for construction of a nuclear reactor.

NEWS ABOUT PEOPLE

Colorado Company Men Get New Assignments

Public Service Co. of Colorado has had several personnel changes recently.

Richard D. Speer, rate engineer, is on leave from his regular position for special assignments and is being succeeded by Herbert M. Edmonds.

John L. McKinley, former system planning engineer, has been promoted to staff engineer, electric operating department. His former post will be filled by Harry K. Polk.

New supervisor of the electric operations analysis department is James J. Springer, formerly senior engineer in electric system planning.

• **Borneo Stoker** of Denver has been elected secretary of California Electric Power Co. He succeeds **John R. Gilbert,** secretary since 1935, who continues as a director, vice-president and treasurer.

• **Harley Young** is new manager of Columbia Basin Electric Co-op., succeeding **Edgar H. Collison.** Collison resigned to become manager of Big Bend Co-op., Ritzville, Wash.

• **Richard N. Henderson,** mechanical engineer with Salt River Power District, has resigned to take a position as technician in charge of the engineering division of the Artibonite Project, Republic of Haiti.

• **T. F. Langham,** assistant to the manager of the power service division of the Salt River Power District at Phoenix, has been promoted to the newly created position of assistant to Seth Bazzil, project treasurer.

• **Alfonso Chiriboga,** Phoenix, has been appointed to the new position of air conditioning consultant for the Salt River Power District. He will assist in residential and commercial air conditioning engineering problems.

• **Herbert Balland** replaces **Bert N. Sorenson** as assistant superintendent in charge of substations for the Northern division of Puget Sound Power & Light Co. Sorenson retired after 34 years service with the company. Named to fill Ballard's former position of service supervisor of the division is **Kenneth Harvey.**

Adams

• **P. H. "Val" Adams** is new manager of the La Jolla district of San Diego Gas & Electric Co. His appointment followed the retirement of **W. J. Gilmour.** Adams vacates the position of chief load supervisor in the electric distribution and transmission department.

• **Charles C. Corfield** is new superintendent of the White River and Electron plants of Puget Sound Power & Light Co., succeeding **Shelley B. Trout** who retired after 50 years service. **Lewis F. Young** follows Corfield as superintendent of Snoqualmie Falls plant.

• **Matt R. Byers** is new manager of Montana Power Co.'s Great Falls division. He succeeds Dix C. Shevalier who has been transferred to Butte as executive assistant. William W. Talbott replaces Byers as Lewistown division manager.

• **John A. Brice** has resigned as secretary of the British Columbia Power Corp., parent company of B. C. Electric, after 30 years of service. He will be retained by the company for several months for special assignments. A successor will be announced later.

• **Edgar J. Ross,** supervising mechanical engineer of Pacific Gas and Electric Co.'s department of engineering, will assume the duties formerly performed by **R. I. Meyerholz,** supervising civil engineer, who recently retired. Meyerholz had 32 years service with the company. Ross will direct work relating to the preparation of design and specifications for company buildings and service groups. Supervision of construction work formerly handled by Meyerholz will be under the direction of the general construction department or divisions as assigned.

Syring

• **Richard H. Syring,** former assistant secretary of Pacific Power & Light Co., has resigned his position to join the staff of Pacific National Advertising Agency. He is director of public relations for the company's Portland, Seattle, Spokane and San Francisco offices. Syring was Northwest manager for the *Wall Street Journal* for many years, and prior to that was Pacific Coast editor of *Business Week* magazine.

Deaths

• **Martin L. Woodard,** president of Marwood Co., died at San Francisco after a heart attack in January. He was 1946-47 president of the San Francisco Electric Club, and well known in the electrical industry.

• **Eugene de Sabla,** 91, a founder of what is now Pacific Gas and Electric Co., died Jan. 19 at his New York home. He also helped found the Pacific Union Club, and was once head of General Petroleum Co.

• **John Peter Fieberling,** retired manager of the commercial division of the East Bay Municipal Utility District, died at an Oakland hospital recently. He was 74 years of age.

• **John A. Emigh,** 52, superintendent of the Kern steam plant of Pacific Gas and Electric Co., died Jan. 7 at his Bakersfield home.

• **Albert Vander Naillen,** 97, civil engineer and Alameda, Calif., County official, died Jan. 8 in Oakland. He was widely known from his association with the Vander Naillen School of Engineering, established by his father in San Francisco in 1871.

NOTES ON THE TRADE

Separate Companies Go In B-L-H Reorganization

Baldwin-Lima-Hamilton Corp. has dissolved four wholly owned subsidiaries, operating as independent companies, to integrate them into the national organization as divisional units.

Affected are: Austin-Western Co., Aurora, Ill.; Hydropress Inc., New York City; Pelton Water Wheel Co., San Francisco; and O. S. Peters Co., Washington, D. C.

William F. Boyle, San Francisco, is now West Coast vice-president of B-L-H and general manager of the Pelton division. He is also vice-president of the Madsen Works, a B-L-H operation in Los Angeles. Robert L. Woltz will act as controller, assistant secretary and assistant treasurer of the Pelton division.

• **Adhesive check-off labels** for oil circuit breaker maintenance are now available free of charge to utilities from Allis-Chalmers Mfg. Co., Industrial Press, Industries Group, Milwaukee 1, Wis. Similar to adhesive forms used by auto service stations.

• **R. W. Brogan** Co., 306 Enterprise Bldg., Denver, is now exclusive representative of **Sunwarm** Inc. in Utah, Colorado, eastern Idaho, Montana, Wyoming and New Mexico.

• **Reynolds Metals** Co. has announced promotion and transfer of two Pacific Coast sales executives. **Richard N. Peters** is new division sales manager at San Francisco and **John Clearwater** succeeds Peters as division manager in Seattle. **A. D. Reynolds III** was recently transferred from San Francisco to the Detroit regional office.

• **General Electric** Co. Locke Department has named **Grover E. Fanning** district manager in northern California and western Nevada. His former position as district manager for the Oregon-Washington district will be filled by **A. Rohl Barnes,** former G-E Supply sales engineer, Portland.

• **Alan J. Bronold** has been elected vice-president of **L. W. Davidson & Associates,** architects and engineers. The company is an affiliate of North American Industrial Engineers Inc. Bronold was formerly an executive of Sterling Electric Motors Inc., and prior to that was with Westinghouse Electric Corp.

• **Prescolite Manufacturing** Corp. has undertaken an expansion project that will double its factory size. The new facility will be a 45,000-sq-ft building across from the firm's present quarters. Total cost of land and building will be about $250,000, with another $50,000 investment in new equipment. Clarewood Co., Berkeley, is the contractor. Completion is expected about Feb. 1. About 50 more employees will he added, bringing the total to 400.

• **R. A. Vaill** is new Western regional manager of the **Edwards** Co. Inc., Norwalk, Conn., and moves from San Francisco to Los Angeles. **W. L. Pierce Jr.** replaces Vaill in San Francisco.

• **M. S. Umberhauer** has been appointed manager of power plant design for the **Fluor** Corp. Ltd. He fills a newly created post.

• **Atomic International** is in new quarters at 21600 Vanowen St., Canoga Park (Los Angeles, Calif.).

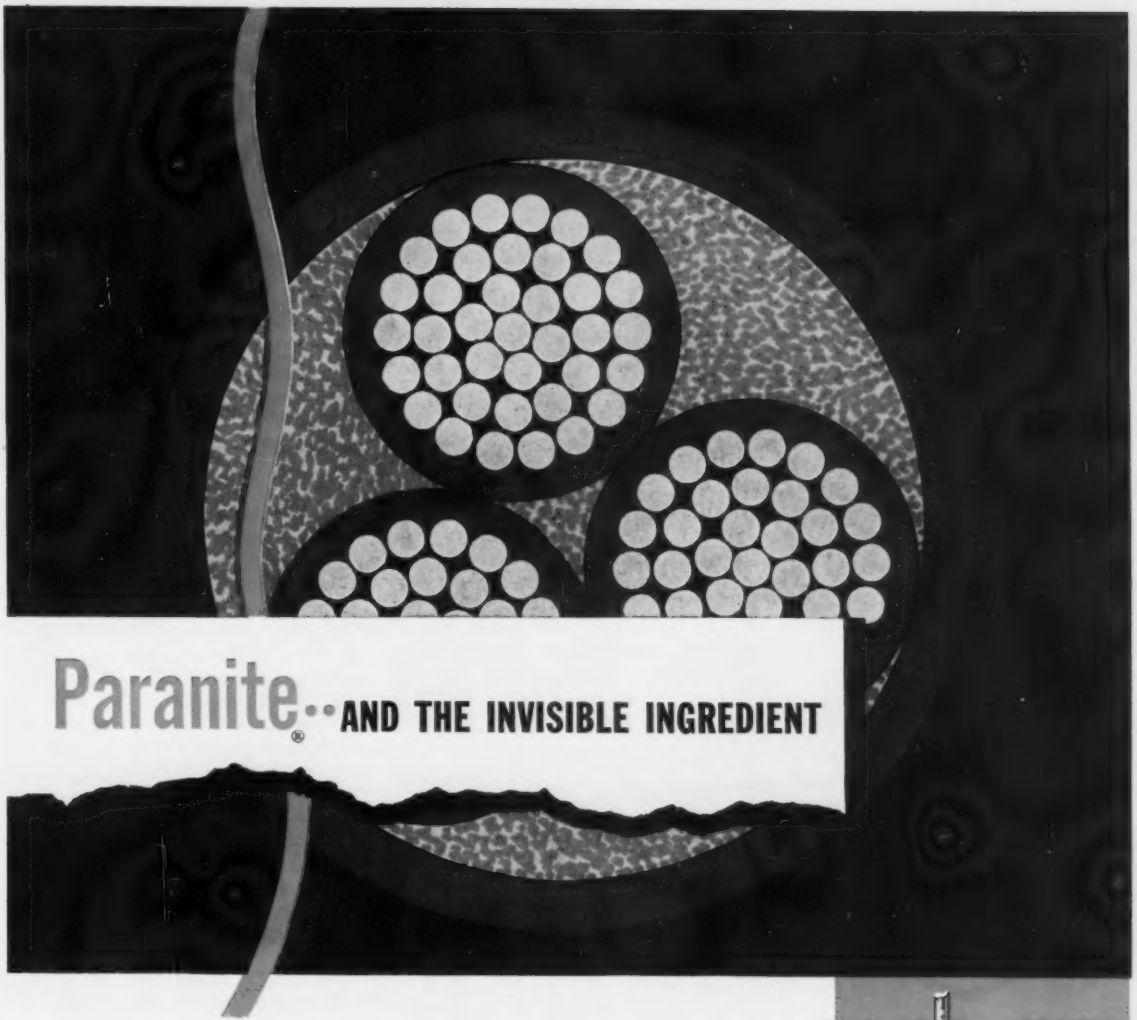
• **L. G. Maechtlen** of **Square D** Co.'s Western division was one of the participants in his company's executive planning meeting held in Milwaukee in December. The meeting was called Operations Review and Forecast, and took place at the end of a record year for the company.

• **Atomic International,** a division of North American Aviation Inc., has added **Frederick C. Gronemeyer** and **James C. Cochrane** to its staff. Gronemeyer, formerly with Fluor Corp., will work on a sodium graphite reactor project for a Nebraska power district and Cochrane, formerly with AEC and the Navy's bureau of ships, will work on his company's sodium reactor experiment.

• **Columbia-Geneva Steel** Division offices in San Francisco are now at 120 Montgomery St., San Francisco 6. It is a division of United States Steel Corp.

• **John Renie,** with **Graybar Electric** Co. in Seattle, Tacoma and Portland for many years, was recently promoted to district manager at Chicago. He has been assistant district manager there since February 1955.

• **General Electric Tube Department** has established a warehouse and commercial service office at Seattle. The new building is located at 220 Dawson St.



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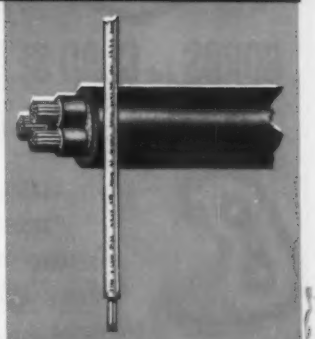

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Shealy

• **Alexander N. Shealy** has been appointed a member of the electrical engineering section of **Kaiser Aluminum & Chemical** Corp. department of metallurgical research at Spokane, Wash. He will direct transmission line research and development. He is a member of the AIEE transmission and distribution committee and the AIEE tower, poles and conductor subcommittee.

• **H. J. Randolph** Co., San Gabriel, Calif., engineering representative for electric power and electronic equipment, has opened a Phoenix office to serve Arizona, New Mexico and El Paso. **Richard Barnes,** formerly with Arizona Public Service Co.'s distribution engineer department, will manage the new office.

• **Bristol** Co., Waterbury, Conn., has named **Robert Steele** as field representative working out of the San Francisco office of the company. He will cover northern California, Oregon and Washington.

• **Leeds & Northrup** Co. has been granted a contract for the complete control system of the 1,000-kw Livermore Pool-Type Reactor to be operated by the University of California for AEC. **Foster Wheeler** Corp. is prime contractor and awarded the L&N contract.

• **Lightolier** Inc. has opened a West Coast sales office at 802 Brack Shops Bldg., Los Angeles. An exhibit of commercial fixtures and display will be maintained.

• **John K. Oliver** is new manager of the Portland electrical division branch office of **Wagner Electric** Corp., St. Louis. He is an associate member of AIEE.

• **The third edition** of the BEAMA Catalog, a publication of the British Electrical & Allied Manufacturers' Assn., is now available free to qualified electrical industries. It is a 1,000-page volume, fully illustrated to help overseas buyers know about British products.

• **Sylvania Electric Products** Inc. has announced plans for a new 86,000-sq-ft warehouse and sales office in Los Angeles. Construction is expected to be complete May 1 of this year.

• **Wilson M. Dusenberry,** former Mountain States division manager for **Line Material** Co., is now sales manager of the company. He was promoted from division manager of the Southwest division, Dallas.

• **Dominion Electric** Corp., Mansfield, Ohio, has named **Carleton F. Bryan, Fred L. Lestoe** and **Sam J. Maizels** as representatives on the West Coast. Bryan, owner of Fred C. Wood Co., has northern California, Reno and Hawaii; Lestoe will have the territory from Santa Barbara and Bakersfield on the north to San Diego on the south; and Maizels will have Washington, Oregon and Alaska.

• **Paul C. Meyer** has been elected a vice-president of the **Henry J. Kaiser** Co. and will be responsible for all administrative activities of the Kaiser Engineers division and its subsidiaries. He returns to Oakland from Bristol, Pa.

• **Walter E. Biewer** and **Robert E. Day,** Los Angeles, are two of 21 new sales engineers recently graduated from the training school of **Minneapolis-Honeywell's** industrial division. They have been assigned to branch offices.

• **Line Material** Co. has established a new branch office and warehouse at 980 S. Sixth West St., Salt Lake City. Better service to Utah and Idaho customers is the expected result. Field Engineer E. T. Hall will make the new facility his service center. Office and warehouse activities will be handled by J. E. Lieubray, branch supervisor.

• **Harvey Hubbell** Inc. has announced the opening of a new and enlarged San Francisco warehouse and district sales office at 1675 Hudson Ave. G. Anderson is district sales manager.

• **Waltham, De Witt & Krusi,** San Francisco, will represent Subox Inc. in northern California.

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PROFILES

Seattle City Light officials examine the gold plated meter, Seattle's 250,000th, that marks a growth milestone in the 50-year history of the system. From left to right are: Superintendent Paul J. Raver, Ira L. Cotton, W. T. Gustafson, Jon M. Nelson, J. E. McCarty and Paul McCann. General Electric donated meter in honor of the occasion

Edgar John, a foreman in the electric shop of Salt River Power District, operates an oil filter packing device that won him a $50 suggestion award. It halves packing time

Milton Schoenborn, a lineman for Pacific Power & Light Co., receives engraved electric clock from President Paul B. McKee after becoming company's 30,000th stockholder during an employee offering. Looking on are A. J. Moore, left, and G. T. Bragg

Two giant investments in California's future

Since the end of World War II, manufacturers have built or enlarged a total of 7,441 plants throughout Northern and Central California at a cost of-------**$1,744,000,000**

Surely this ranks as one of the great industrial investments of all time.

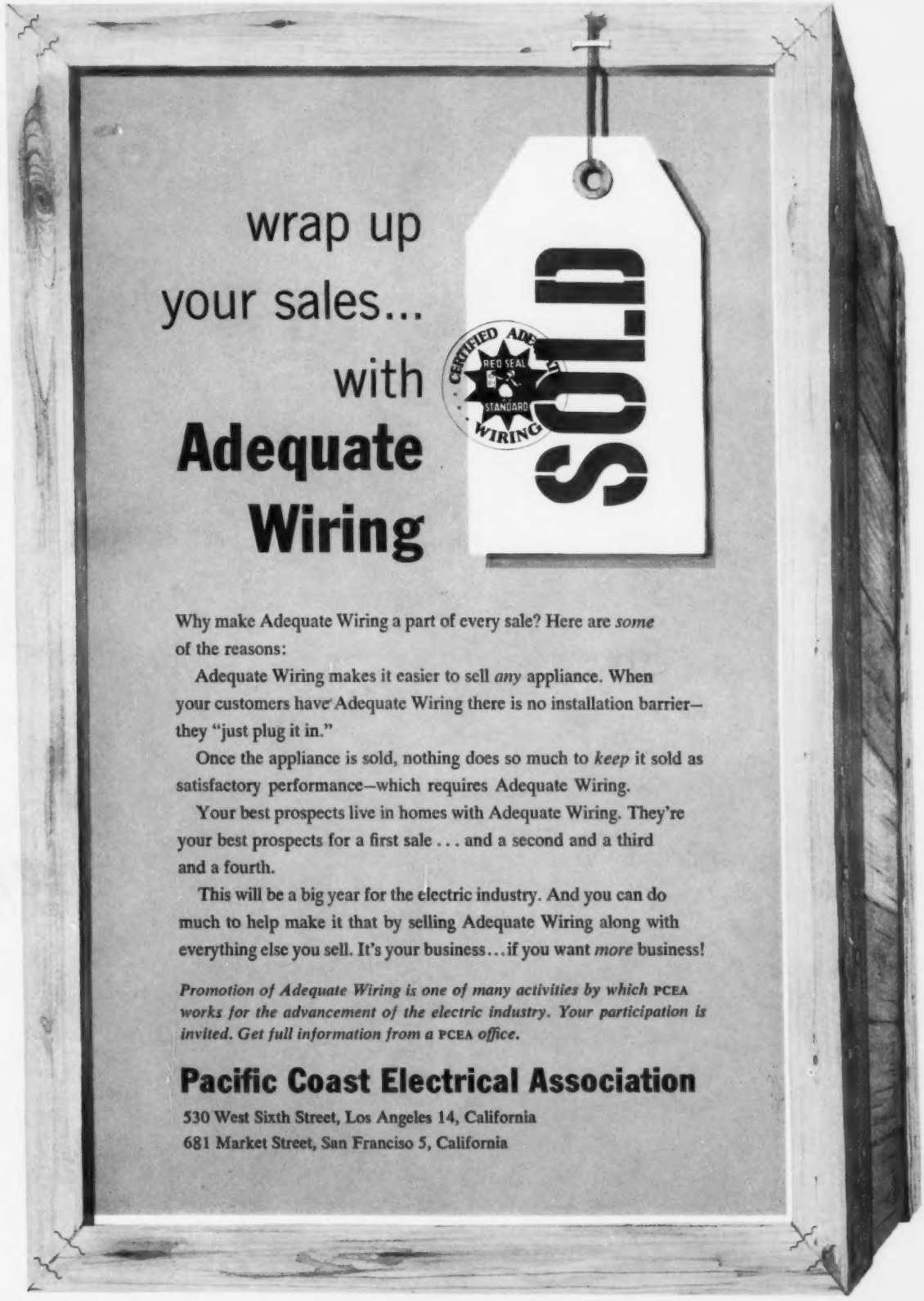
In addition, during the same decade, a single company in this area—P. G. and E.—has expanded its gas and electric facilities at a cost of----------**$1,500,000,000**

Today, industry is continuing its record-breaking expansion in Northern and Central California. And so is P. G. and E., for it has a two-fold aim: to continue to help attract new industry...to keep ahead of the dazzling growth in the area it serves, now and in the years to come.

P·G and E·

Pacific Gas and Electric Company

402-X-256



Why make Adequate Wiring a part of every sale? Here are *some* of the reasons:

Adequate Wiring makes it easier to sell *any* appliance. When your customers have Adequate Wiring there is no installation barrier—they "just plug it in."

Once the appliance is sold, nothing does so much to *keep* it sold as satisfactory performance—which requires Adequate Wiring.

Your best prospects live in homes with Adequate Wiring. They're your best prospects for a first sale . . . and a second and a third and a fourth.

This will be a big year for the electric industry. And you can do much to help make it that by selling Adequate Wiring along with everything else you sell. It's your business...if you want *more* business!

Promotion of Adequate Wiring is one of many activities by which* PCEA *works for the advancement of the electric industry. Your participation is invited. Get full information from a* PCEA *office.

Pacific Coast Electrical Association

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